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TABLE OF CONTENTS

Sulphapyridine and Sulphathiazole for Infected Wounds involving Bone
J. F. HEGGIE, M.B., A. W. KENDALL, F.R.C.S., and R. M. HEGGIE, M.B. 655

Venous Pressure during Venesection and Blood Transfusion
J. F. LOUTIT, B.M., M. D. MOLLISON, M.B., and E. D. VAN DER WALT, M.B. 658

An Outbreak of Paratyphoid B Infection S. CHALMERS PARRY, M.R.C.S. 661

Fatal Phosphorus Poisoning from a Bullet A. J. BLAXLAND, F.R.C.S. 664

Practical Management of Wound Shock J. MCMICHAEL, M.D. 671

MEDICAL MEMORANDA
Urticaria with Pigmentation as a Sequel to Scabies. GEOFFREY HODGSON, D.M. 665

GENERAL ARTICLES AND NEWS
PREPARATIONS AND APPLIANCES 666
MEDICINE 100 YEARS AGO.....684
THE SERVICES 681
UNIVERSITIES AND COLLEGES.....681
MEDICAL NOTES IN PARLIAMENT.....682
MEDICAL NEWS 683

LETTERS AND ANSWERS
Sulphonamides for Leukaemia?—Intractable Urticaria — First-aid Treatment of Wounds—Income Tax—Unusual Skin Sensitivity—Control of V.D.: Correction.....684

REPORTS OF SOCIETIES
ROYAL SOCIETY OF TROPICAL MEDICINE: Bacillary Dysentery in the Middle East.....673

Epidemiology Section 683

LEADING ARTICLES
Infant and Maternal Mortality 667
Anti-pernicious-anaemia Factor 668

ANNOTATIONS
Subacute Bacterial Endocarditis.....669
Infectious Mononucleosis 669
Food Problems in U.S.S.R.....670
See How they Jump.....670
Medical Advisory Committee.....670

REVIEWS
Drugs of Addiction 665
Vaginal Hysterectomy 666
Local Government 666

OBITUARY
J. G. McCutcheon, M.B.....680
Edgar Haydon, M.B.....680
Arthur Birt, M.D.....681

SUPPLEMENT
Annual Panel Conference: Conclusion of Report 69
G.M.C.: Disciplinary Inquiries 71
B.M.A. AT WORK.....72
CORRESPONDENCE 72
BRANCH MEETINGS.....72

CORRESPONDENCE
Physical Treatment of Acute War Neurosis. H. B. CRAIGIE, M.B....675
Erythroblastosis Foetalis. LEONARD G. PARSONS, M.D.....675
Bacteriophage Treatment of Bacillary Dysentery. ARTHUR COMPTON, M.D. 676
First-aid for Fractured Spine. D. K. MULVANY, F.R.C.S.; GEOFFREY HYMAN, F.R.C.S.; J. C. MATTHEWS, M.D. 676
Sulphonamides for Gonorrhoea. L. W. HARRISON, F.R.C.P.Ed.....677
Reporting of Deaths to Coroner. W. B. PURCHASE, M.B.....677
Tetanus. LESLIE COLE, M.D.....678
Prevention of Small-pox. C. KILLICK MILLARD, M.D.....678
Riboflavin Deficiency. I. S. FOX, M.B. 678
Shock Treatment in Psychiatry. D. N. HARDCASTLE, M.R.C.S.; HORACE HILL, M.B.....679
Convulsions under Trilene Anaesthesia. T. D. CULBERT, M.B.....679
Tonsillectomy. E. S. B. HAMILTON, F.R.C.S.Ed. 679
Sedimentation Rate. GEORGE DAY, M.D. 679

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INFECTED WOUNDS INVOLVING BONE TREATED WITH SULPHAPYRIDINE AND SULPHATHIAZOLE

BY

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Compound fractures caused by bomb splinters and other high-velocity particles and chiefly infected with *Staphylococcus pyogenes* were treated with sulphapyridine and sulphathiazole in addition to standard antiseptic and surgical measures. From our observations four main conclusions were reached: (1) Chemotherapy is a very necessary supplement to the surgical treatment of staphylococcal osteomyelitis in wounds. (2) Sulphathiazole is more efficacious than sulphapyridine in the treatment of these staphylococcal infections when the necessary blood concentration is obtained by oral or intramuscular administration. (3) Our results and experience in cases of staphylococcal infection established in bone indicate the advantage of combined oral and local administration of sulphathiazole when given at the time of surgical intervention, especially during radical surgical treatment. (4) Sulphathiazole applied locally, alone and unsupported by simultaneous oral administration, is of but limited value in the presence of slight or moderate but established staphylococcal infection in wounds involving bone even on repeated application, and even after the bulk of the infected focus has been removed surgically.

In the absence of adequate simultaneous chemotherapy the surgical treatment of staphylococcal osteomyelitis complicating wounds may be attended by acute diffuse inflammatory changes locally and by varying degrees of bacteriaemia. Of the antibacterial drugs at present available for general clinical use sulphanilamide, sulphapyridine, and sulphathiazole can effect varying degrees of bacteriostasis. The superiority of sulphathiazole over sulphapyridine and sulphanilamide in such cases is in accord with the *in-vitro* finding that sulphathiazole is the most effective of these antibacterial sulphonamides and is 10 times more bacteriostatic against *Staph. pyogenes* than is sulphapyridine. The optimum times for the administration of sulphathiazole are pre- and post-operatively at sequestrectomy or at the removal of the entire infected focus—that is, when the amount of infection is so reduced that the concentration of free sulphathiazole in the blood and tissue fluids from oral administration, and the higher local concentration in the opened wound area from local application, will ensure maximum inhibition of the growth of remaining staphylococci for the time necessary for these organisms to be killed by the drug or dealt with by the body-defence mechanisms. The meagre results from local application alone are to be expected; for in such instances the high concentration of free sulphathiazole available for effective bacteriostasis (saturated solution in serum or exudate) is limited to a depth of only a few millimetres from the surface, since ready and free absorption of the drug into the lymph and blood streams results in a rapid fall in concentration to an ineffective antibacterial value in the deeper fibrous and osseous tissues of the wound in which staphylococci persist. The cases described below illustrate these points and other observations we wish to make.

Before admission to base hospital, active surgical treatment of a preliminary kind had been carried out, usually within 24 hours of injury; but this interval varied—2 to 3 days was common, 7 to 8 days was the extreme. Sulphapyridine in adequate doses orally, starting from the day of, or that following, the first operative treatment, may have accounted for the good general health and satisfactory progress in some cases found moderately infected on admission. In cases of severe injury the effect of sulphapyridine was less noticeable, but delay in primary surgical treatment probably contributed more to the detriment than sulphapyridine to the benefit of these. After admission cases requiring sequestrectomy received several courses of sulphapyridine to control recurring acute exacerbations of the staphylococcal osteomyelitis. It was in such cases that, after a "control" period of sulphapyridine therapy, sulphathiazole was given.

Persistence of Staphylococcus in Latent Foci

First of all it is necessary to recall and emphasize the persistence of pathogenic staphylococci in the deep and osseous tissues of infected wounds. This is an early manifestation which has its later counterpart in recurring acute exacerbations in the subacute and chronic phases of staphylococcal osteomyelitis. When, after surgical and chemotherapeutic treatment, granulating surfaces and exudates are bacteriologically sterile and the wound is healing well, and when, later, surgical measures prove necessary—e.g., trimming of a stump—organisms in latent foci may rapidly bring about grave local and constitutional disturbances. This case is an example.

Case 1.—Youth aged 17. Sustained three major bony injuries and burns of face and hands. Left foot amputated first day after injury on account of compound comminuted fracture of left tibia involving the ankle-joint. Stump became septic with sloughing (6th day). Admitted to hospital. *Staph. pyogenes* was the only organism recovered. Sulphapyridine 35 g. given in next 6 days. Improvement slow but steady. Clinical sepsis diminished. *Staph. pyogenes* last recovered 42nd day. Stump healed well, fibula protruded for 1½ in.; trimmed 94th day. Within 4 days the wound broke down over a fairly large area. Moderate pyrexia. Sharp anaemia: 93rd day—R.B.C. 4,800,000/c.mm., Hb 96%; 94th day—operation; 98th day—R.B.C. 2,900,000/c.mm., Hb 55%. The excised tissue yielded *Staph. pyogenes* in pure culture from the deeper parts of the granulations, the periosteum, and medulla of the fibula. The anaemia was due to the absorption of the α-haemolysin of the staphylococcal toxin.

In a previously infected case such as this pre- and post-operative chemotherapy are necessary to secure, at the time of operation and later, an adequate blood concentration of antibacterial sulphonamide to combat transient staphylococcal bacteriaemia and to support a local application of the sulphonamide in providing an effective bacteriostatic concentration of the drug in the wound area against foci remaining after, or foci resulting from dissemination during, surgical intervention. Both oral and local administration should be undertaken in all such cases, for, although either alone may suffice, there are occasions when what may be regarded as "near misses" result from want of the combination. For example, in the next case, but for greatly increased dosage, oral administration alone would have failed to effect the necessary bacteriostasis.

Case 2.—Patient aged 38. Compound fracture lower end left tibia and fibula complicated by secondary haemorrhage and osteomyelitis due to *Staph. pyogenes* and haemolytic streptococci. Healing was slow, and was interrupted by acute exacerbations associated with sequestra. Amputation was decided. Sulphapyridine had not been tolerated well. Haemolytic streptococci were recovered until 49th day; *Staph. pyogenes* was recovered to time of operation and in the amputated limb from the deep granulations and bone. Pre-operatively, sulphathiazole 7 g. in 18 hours to within 2 hours of operation. Drug well tolerated.

Post-operatively, 1st 24 hours, sulphathiazole 9 g.; 2nd 24 hours, 8.5 g. During this period, however, the limb became painful and there was much redness and oedema of the stump; so in the 3rd 24 hours sulphathiazole was increased to 20 g. (4 g. 4-hourly). Acute nausea resulted; fluid intake was much reduced, but there were no urinary disturbances. Effect on stump striking and immediate. 4th day: Diameter of limb reduced by 1/2 in. 5th day: Nausea ceased; fluid intake increased to 5 pints. The serous discharge from the posterior aspect of the wound yielded *Staph. pyogenes* until 10th day. Wound epithelized by 17th day. Further progress uninterrupted. 18 months later: no exacerbations.

In this case we have concluded that the blood concentration of free sulphathiazole in the first 2 days (6.5 mg. per 100 c.cm.) was adequate to stem the bacteriaemia and to effect a certain measure of bacteriostasis locally, but the higher concentration of the 3rd day (8.6 mg.) and the concentrations of the 4th and 5th days (7.25 and 5.5 mg.) were necessary to control the local infection. A local application of 10 g. or thereabouts at the time of operation would have aided bacteriostasis in the stump at the site of amputation, and the much-increased oral dose of 20 g., well tolerated on the 3rd day, might not have been necessary. Alternatively, had the amount of sulphathiazole on the pre-operative and first post-operative days been 15 g. and 10 g. respectively, a further amount of 10 g. on the two succeeding days might have sufficed and no local infection developed.

These two cases stand in marked contrast. In the first, in the absence of continued chemotherapeutic measures, the amputation site became acutely and widely inflamed and broke down, pyrexia and acute haemolytic anaemia occurred, the staphylococcal infection persisted in the stump for 64 days, and healing was delayed until the 70th post-operative day (see below). In the second, using sulphathiazole, infection was controlled almost completely: from want of local application of sulphathiazole at the time of operation staphylococci persisted until the 10th day; nevertheless the degree of bacteriostasis obtained allowed the apposed flaps to heal and the scar to epithelize by the 17th post-operative day. There can be little doubt of the necessity for continued chemotherapeutic measures and for combined oral and local administration.

Superiority of Sulphathiazole in Staphylococcus Infections

It has been shown by Fleming's sulphonamide "impregnated strip" method in culture media that sulphathiazole is 10 times more bacteriostatic than sulphapyridine against *Staph. pyogenes*. The superiority of sulphathiazole over sulphapyridine in staphylococcal infections is fairly clearly demonstrated in the following case, in which the latter sulphonamide effected only partial, temporary amelioration, while the former, although given later, secured complete resolution.. It could be argued, however, that in this case the number and virulence of the staphylococci had been reduced by previous treatment with sulphapyridine. Be that as it may, complete resolution occurred within a remarkably short time—10 days—after sulphathiazole was used, while with sulphapyridine therapy partial resolution only was recorded.

Case 3.—Midshipman aged 18. Sustained tracer bullet wounds of left leg with much muscle damage. First active treatment was on 7th day after injury; on the 12th a large abscess in leg was opened and muscle sloughs removed. There were two severe secondary haemorrhages, 15th and 21st days, and mid-thigh amputation was done immediately after the second. The patient was dangerously ill; blood transfusions were numerous, but anaemia was marked. Pyaemia developed on 25th day and showed some temporary resolution after intramuscular sodium sulphapyridine therapy. Fresh metastatic foci appeared on 32nd day, but sulphapyridine orally was of minor value. Abscesses were opened at intervals until the 50th day. Metastatic foci appeared afresh on 57th day. Sulphathiazole was given orally. Temperature settled and foci showed resolution within 10 days. Further recovery was uninterrupted. The patient returned to full flying duties and there were no exacerbations in the succeeding year. Sulphonamides were given as follows: 7th to 11th days, sulphapyridine, orally, 35 g.; 26th to 29th days, sodium sulphapyridine, intramuscularly, 17 g.; 32nd to 35th days, sulphapyridine, orally, 30 g.; 57th to 62nd days, sulphathiazole, orally, 30 g. Despite the good effect of oral sulphathiazole on the resolution of the metastatic foci, the stump exudate continued to yield *Staph. pyogenes*, the only organism present throughout. Sulphathiazole powder 1 g. was applied locally, and was repeated 7 days later. *Staph. pyogenes* was recovered until 20th day after application, but was becoming less haemolytic—1/10 to 1/160 of former value. This loss of haemolytic value of the toxin was not permanent, and was recovered somewhat after 6 daily subcultures in ordinary broth.

As in Case 2, the clinical improvement after sulphathiazole therapy was much greater than anticipated, and in attributing the benefit to the sulphathiazole the result accords well with the *in-vitro* estimations of the relative bacteriostatic effects of these compounds.

Local Application

The effect of local application of sulphathiazole to a wound already infected is seen in the later treatment of the first case described, in which, after the acute inflammation of the stump had subsided, the local application of sulphathiazole was combined with immobilization in plaster, but unsupported by simultaneous oral chemotherapy.

Case 1 (continued).—Twelve days after stump was trimmed, temperature settled. Sulphathiazole powder 10 g. applied to raw areas and covered with vaselined gauze, and stump enclosed in plaster. 16th day: Plaster changed, only *B. proteus* isolated. 47th day: Pain in stump, moderate rise in temperature; plaster removed. *Staph. pyogenes* recovered from exudate then and in diminishing numbers for another 14 days—i.e., 47th to 61st days from application of sulphathiazole powder. Epithelized at 70th day.

Had a second application of sulphathiazole been made at the time of changing the plaster (16th day) the infection would almost certainly have terminated by the 21st day or so. All the powder was seen to be absorbed on the 16th day—the one application was not sufficient to provide adequate concentration of antibacterial substance for the necessary time in the subjacent tissues, from some residual foci in which reinfection of the wound area occurred. Later experience and estimations of sulphonamides in the washings of wounds showed that sulphathiazole is usually all absorbed at the 5th day. This case illustrates a certain minimum degree of effectiveness of one local application alone to bring about bacteriostasis. The following case is an example of the effect of repeated applications of sulphathiazole locally—again unsupported by simultaneous oral administration: this case was relatively more heavily infected at the time of treatment.

Case 4.—A man aged 25 sustained multiple wounds from a shell-burst. The concerned wound was penetrating: the fragment entered at the back of the left arm and came through the shoulder. The wound became infected; for long there were discharging sinuses. The humeral head showed osteomyelitis after fracture. Following increased pain in shoulder the sinuses were opened up and curetted; no sequestra were found. neither was bare bone seen. Sulphathiazole powder 10 g. was packed in the wound. Cultures at 8th day after this were sterile, but *Staph. pyogenes* was isolated again from 17th day onwards. There was an exacerbation on the 45th day; at a further operation on the 48th day the head of the humerus, mostly sequestrum, was removed, the wound cleared out, and sulphathiazole

powder (10 g.) packed in wound. 3.3 g. sulphathiazole was excreted in the urine in the first 24 hours. Eleven days later *Staph. pyogenes* was recovered. The wound was re-dressed and sulphathiazole 10 g. in saline–tragacanth sludge used. The wound was examined, cultured, and repacked with sulphathiazole in slowly diminishing amounts (according as the volume of the wound diminished) at 5-day intervals. Healing was slow but satisfactory. Cultures at the first, second, and fourth intervals were sterile, but those at the third, fifth, sixth, and seventh yielded *Staph. pyogenes* in pure culture, but showing diminishing values for the α-haemolysin of the exotoxin in association with the continuous environment of sulphathiazole. The wound was sterile from the 51st day after the second operation and epithelized at the 60th day. Further progress was uneventful.

It will be noted that on each occasion when the bulk of the infection was reduced—after curettage and increased drainage in the first instance, and excision of the infected focus, the humeral head, in the second—the local application of sulphathiazole secured only temporary bacteriostasis: complete sterilization of the wound was not obtained. Sterilization —as judged by cultures from the wound surface and of exudates—occurred for brief periods. Had oral administration been combined with the first local applications at the times of surgical intervention, and the concentration of sulphathiazole in the blood and tissue fluids been thus higher at the time of "opening" of the foci, it is probable that bacteriostasis in deep-seated foci would have been more speedy and complete. And again, it is probable that results would have been more satisfactory *qua* speedy bacteriostasis had the wound been repacked on each 4th day rather than on each 5th, for the patient excreted on an average 3 g. of sulphathiazole daily, with the result that on each 4th day there was only 1 g. left in the depot (that is to say, when the depot was 10 g. in the first instance). Nevertheless we believe that this would have made but little difference so far as deep-seated foci were concerned.

One other factor to be considered regarding the local application of sulphathiazole in ordinary powder form to wounds is the probability that aggregation of particles and clumping occur, hindering solution and interfering with steady diffusion from the depot to the wound area. In Case 4 we made a suspension of sulphathiazole in a saline–tragacanth base. Later we used a glycerin–jelly base, part of the sulphathiazole being first dissolved in the glycerin: the remaining particulate part probably dissolved in the exudate resulting from the lymphagogue action of the glycerin, for in such instances we remarked the absence from the walls of the wounds of the sulphonamide-impregnated fibrin "felt" sometimes seen when ordinary powder was used.

Effect of Sulphathiazole on Staphylococci

As regards the effect of sulphathiazole on the staphylococcus it will have been noted that in two of the cases described the organisms that were recovered at intervals from the wound areas to which sulphathiazole had been repeatedly applied were altered in character. The coagulase was never affected, but the haemolytic strength of the α-haemolysin was progressively reduced, first to 1/10 of its former value and later almost to zero, when estimated in the filtrate of a standard 24-hour broth culture. This effect was subsequently confirmed by suitable *in-vitro* experiments, using varying inocula of a subculture of the original virulent organisms and varying concentrations of the three sulphonamides. On further repeated subculture in broth from which all sulphonamides were omitted the strains showed recovery in α-haemolysin from almost zero to 1/20 of the original values shown by the virulent cultures when first isolated. It is probable that since the sulphonamides are believed (Fildes, 1940) to act by blocking the enzyme concerned with the utilization of *p*-aminobenzoic acid by the bacterium, the enzyme and the *p*-aminobenzoic acid are necessary to the *Staph. pyogenes* for the elaboration of the α-haemolysin of the exotoxin. We would also add that so far we have not encountered a strain of *Staph. pyogenes* which is sulphonamide-resistant.

Discussion

When wounds involve bone in which staphylococcal infection is established it is common to find repeated courses of sulphonamides necessary in treating the acute exacerbations of the local condition and possible systemic effects. This may be on account of either (i) the inability of the concerned sulphonamide *per se* to bring about complete or the minimum bacteriostasis necessary for healing, or (ii) the reactive "inaccessibility" of the focus of infection to the drugs—or both.

The conditions under which the sulphonamides are actively bacteriostatic are now clearly defined. They are *active* only when in sufficient concentration in solution in the blood and other body fluids, 4 to 6 mg. per 100 c.cm. being a minimum level; and in this regard it should be noted that as their solubility in serum and other fluids varies, sulphanilamide being the most and sulphapyridine the least soluble, so also will the rates of absorption and the eventual fluid and tissue concentrations vary. In turn these variations will modify the effective bacteriostatic concentration resulting from the use of a given sulphonamide, for these substances vary also in their antibacterial effect, sulphathiazole being 10 times more bacteriostatic than sulphapyridine, and sulphapyridine in turn 5 times more active than sulphanilamide. Thus the absolute or resultant sulphonamide-bacteriostasis effected at any time is a function of the amount, solubility, and antibacterial index of the particular sulphonamide prescribed. The sulphonamides are *inactive* in the presence of large numbers of organisms and pus cells, and the disintegration products of these and of the tissues and fluid exudates.

The mode of action of the sulphonamides is now fairly well understood. They are directly antibacterial or bacteriostatic and inhibit the growth of organisms by competing with one or more of the essential growth-promoting substances (e.g., *p*-aminobenzoic acid, which is closely related chemically to sulphanilamide) for the enzyme or enzymes concerned with the utilization of these. The presence or absence of growth depends on the relative concentrations, and is proportional to, for example, the ratio of the growth-promoting *p*-aminobenzoic acid to the antagonistic or growth-inhibiting sulphonamide. Certain concentrations of the sulphonamides are thus prerequisite; but, even when obtained, the degree of bacteriostasis effected is dependent on the amount of neutralizing growth-promoting substances present, and these relatively simple chemical substances which promote growth are found in the disintegration products of tissues, pus cells, organisms, and fluid exudates. In the tissues the sulphonamides diffuse fairly freely and relatively quickly, and so from any established depot in a wound the concentration gradient in adjacent tissues shows a steep fall as the drug is absorbed into the general circulation. Again, the concentration in any tissue is a function of the water content, and consequently is lowest in fat, bone, and fibrous scar tissue.

All these things considered, it is perhaps obvious that, in the requisite concentration, this group of drugs will be more effective in cases of slight to moderate rather than in severe septicaemia, and early rather than late in pyaemia: and results will be more favourable *qua* bacteriostasis in the milder forms of these conditions than in cases of established localized infections in which the number of organisms may be relatively great and in which in addition there is serous exudation, a well-developed round-cell infiltration, and granulation and fibrous tissue. Thus, for example, it is agreed that, using sulphapyridine, it is easier to secure a successful result in the treatment of pneumococcal pneumonia than in lung abscess complicating that condition.

Similarly, having regard to the steep diffusion gradient, number of organisms, leucocytic infiltration, and fibrosis of the healing process, the *local application* of sulphonamides to wounds infected deeply would be expected to be of relatively little value. We have noted much delay, failure even, to secure bacteriostasis in wounds in which bone is involved and in which there is subacute or chronic osteomyelitis with sclerosis. The reappearance of the staphylococcus in exudates from such deep foci has been common. In this type of case it has been much easier to effect bacteriostasis or delay the reappearance of the organism by using local applications from the time of sequestrectomy or amputation, when the wound has been opened up or the bulk of the focus removed, than from a later date when infection has reappeared, say, 1 to 5 weeks after operation, when granulations are well formed

and fibrous healing is proceeding apace in the depths, and when 5 or even 10 local applications at intervals have been necessary to obtain a measure of bacteriostasis, which even then may be only temporary.

And as, according to the example cited, it is easier to treat to a successful conclusion the pneumonia from the outset than the complicating lung abscess later, so in cases of infected wounds involving bone it is prudent to employ full chemotherapeutic measures at the time of full surgical treatment rather than later, when sequestra and sinuses may have formed in association with established infection. Full surgical procedure is of first importance, but we would emphasize that in cases of the kind considered here the pre- and post-operative administration of a sulphonamide, preferably sulphathiazole, is equally essential, and should be supplemented by local application, especially when many fascial planes have been disturbed or there is much tissue damage. For minimum pre-operative medication, 6 g. of sulphathiazole within 4 hours yields a blood concentration of 4 mg. per 100 c.cm., so that intramuscular and intravenous routes are not always necessary to supply the immediately available sulphonamide requisite in the blood and tissue fluids.

There is little doubt that sulphathiazole should replace sulphapyridine, both orally and locally, in the treatment of such cases of staphylococcal infection, for this drug is better tolerated and has a greater bacteriostatic action. Further, adequate oral administration of sulphathiazole should be continued as necessary, so that essential tissue-fluid concentrations are present when multiplication of organisms occurs or is likely to occur, thus ensuring that bacteriostasis is sufficient to permit the several body-defence mechanisms to operate unhindered or in conditions as favourable as possible.

Comment

While the treatment of infected compound fractures in wounds is essentially surgical, the role of the sulphonamides must not be forgotten or ignored. Sulphathiazole particularly is a valuable supplement. Given orally and locally at the time of major surgical measures, it provides the desired maximum bacteriostatic action when and where the diminished remaining foci of infection are most open to successful attack.

Since staphylococcal osteomyelitis is likely to be a not uncommon feature of many severe wounds sustained in this war by civilians and Service personnel alike, it behoves those concerned with early treatment to ensure that surgical treatment is adequately supplemented by chemotherapy so as to prevent the establishment of infection in bone, the treatment of which is notoriously difficult.

Summary

Sulphathiazole is more efficacious than sulphapyridine in the treatment of wounds with compound fractures that have become infected with *Staph. pyogenes*. The necessity for pre- and post-operative chemotherapy with this sulphonamide is stressed, as is also the combination of local with oral administration, especially at the time of radical surgical treatment. Sulphathiazole applied locally unsupported by simultaneous oral administration is of little value in the treatment of established infections of the kind discussed. Four cases are described illustrating these observations.

Strains of *Staph. pyogenes* recovered from our cases showed diminution of the α-haemolysin production but no alteration in coagulase in association with a local environment containing sulphathiazole. No sulphonamide-resistant staphylococci were encountered.

Our thanks are due to the Medical Director-General of the Navy and to Surg. Rear-Admiral H. E. R. Stephens, R.N., for permission to record these cases. We are indebted to Messrs. May and Baker Ltd., who kindly supplied the sulphathiazole used in the treatment of our early cases; and to Sick Berth Chief Petty Officers F. C. Prince and A. R. Woodman for technical assistance.

REFERENCE

Fildes, P. (1940). *Lancet*, 1, 956.

J. Lusser (*Ann. Pediatr.*, 1942, **152**, 226) records his observations on 1,000 cases of scarlet fever at the children's clinic at Basle during the period 1930-40, 368 of which had relapses. 127 of the latter had recurrent eruptions. The second or third attacks usually had a mild course. The ages of the patients ranged from 1½ to 15 years; the incidence was highest between 4 and 15, while young children were less frequently attacked.

VENOUS PRESSURE DURING VENESECTION AND BLOOD TRANSFUSION*

BY

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In man few observations have been made on the changes in venous pressure during the withdrawal and administration of blood, although the effects during the intravenous injection of crystalloid solutions have been investigated (Altschule and Gilligan, 1938; Murphy, 1941). In the present paper observations of venous-pressure changes have been made upon healthy individuals during venesection, and upon unselected hospital patients during the administration of blood. As an extension of this work similar observations were made during the transfusion of a number of patients suffering from pulmonary disease: in this group the vital capacity was measured before, during, and after transfusion. In all cases preliminary and final arterial blood pressures were taken, the pulse and respiratory rates noted at frequent intervals, and any change in the clinical condition of the subject recorded.

The venous pressure was estimated by the direct method, using a modification of the original Moritz and von Tabora (1910) technique. A stand was made with a backboard, to which the vertical arm of the manometer was clamped. The crosspiece rested on a horizontal ledge attached to the backboard. The backboard-and-ledge system was easily adjustable to different heights. In place of the reservoir a 30-c.cm. syringe, also resting on the horizontal ledge, was fitted to the crosspiece. By means of this syringe the manometer (7 mm. bore) was filled with 3% sodium citrate solution, and thereafter was flushed with this solution when required. The reference point taken was that recommended by Lyons *et al.* (1938)—an arbitrary point, with the subject supine, 10 cm. above the posterior surface of the thorax. The arm used for the venous-pressure estimation was abducted to an angle of 45 degrees. Where necessary, to prevent venous spasm a hot-water bottle was placed underneath the arm. Warm citrate solution was used throughout. An intradermal injection of local anaesthetic was given before all venepunctures.

An antecubital vein was chosen. A 16 S.W.G. intravenous needle was then inserted and connected with the manometer. If the needle was well in position the fluid in the manometer fell rapidly at first but later more slowly until equilibrium of pressure between the fluid in the manometer and the blood in the vein was reached. At this point there were minor respiratory fluctuations, either spontaneous or easily induced by deep breathing and occasionally pulse transmissions. Approximately 1 to 5 minutes were allowed to elapse before proceeding further, to ensure a steady base line of venous pressure. Throughout the experiment a rapid return of the manometer reading to the original level, after the apparatus had been flushed with fresh citrate, was regarded as the best criterion of patency of the system. In 4 cases venous spasm resulted in unsatisfactory readings and these records had to be abandoned.

Venesection

To minimize anxiety in the subject only donors previously venesected were chosen. In all cases complete rest for 10 to 15 minutes in the supine position was imposed, to allow the blood pressure and pulse rate to become stable. The venous pressure was then determined. Venesection with a 10 S.W.G. intravenous needle was performed on the opposite arm. A sphygmomanometer cuff maintained at a pressure of 60 to 70 mm. Hg facilitated the flow of blood. The average time taken to collect 430 c.cm. was 4 minutes. The venous pressure and pulse rate were recorded after 100 c.cm., 200 c.cm., 300 c.cm., 400 c.cm., and 430 c.cm. of blood had been with-

* A report to the Medical Research Council from the S.W. London Blood Supply Depot.

drawn. In most cases the venous-pressure readings were continued at 5-minute intervals for 30 minutes after venesection.

In 19 of the 20 cases the initial venous pressure varied between 60 and 145 mm. H_2O. In one very obese woman the pressure was 167 mm. H_2O (Table I). In every case there

TABLE I.—*Effect of Venesection on Venous Pressure, Blood Pressure, and Pulse Rate*

Case	Venous Pressure (mm. H_2O)			Blood Pressure		Pulse Rate	
	Before Venesection	After Venesection	30 min. Later	Before Venesection	After Venesection	Before Venesection	After Venesection
1	115	35	44 (15 min.)	120/85	—	80	78
2	97	43	46 ,,	95/60	—	68	70
3	115	52	90	145/90	140/90	80	80
4	110	55	90	140/90	140/90	80	80
5	167	110	112	140/85	130/80	72	72
6	110	50	—	154/104	154/100	76	76
7	125	75	95	130/75	112/95	88	92
8	130	80	90	148/85	145/85	100	96
9	80	30	31	105/65	105/65	75	84
10	130	115	80	136/84	—	112	112
11	94	48	80	105/60	105/70	90	92
12	148	105	105	130/90	—	70	70
13	79	43	57	115/70	112/70	84	78
14	130	95	98	148/106	140/102	76	76
15	60	25	—	110/76	108/76	96	96
16	100	78	85	170/110	160/110	100	100
17	72	55	55	125/80	110/70	76	76
18	68	58	55 (15 min.)	118/75	—	88	94
19	145	110	109 ,,	155/95	135/75	100	76
20	75	30	53 ,,	115/80	115/60	88	56

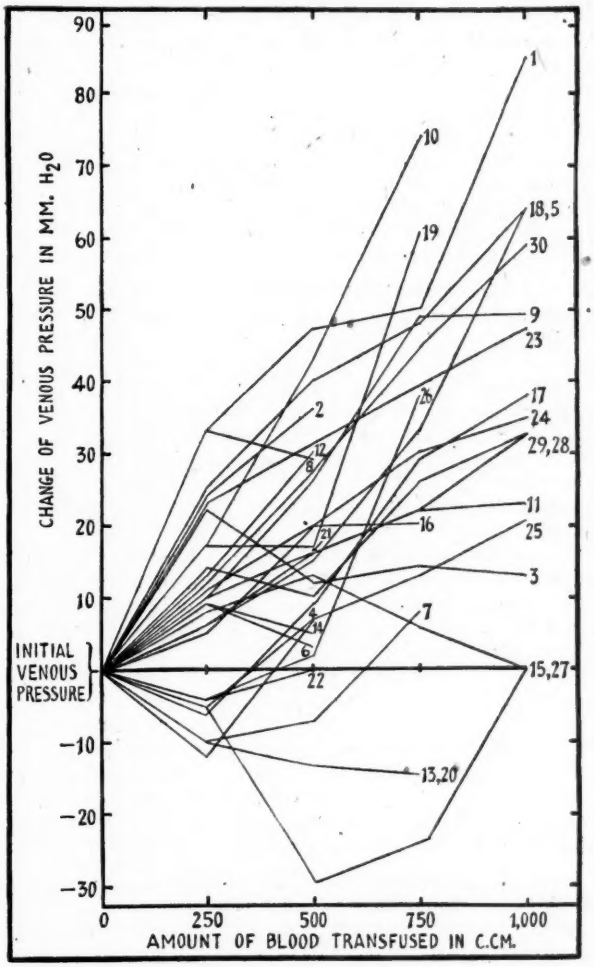
was a fall in the venous pressure during bleeding, varying from 13 to 80 mm. H_2O, with an average of 43 mm. In most cases the venous pressure showed a fall after 100 to 200 c.cm. of blood had been withdrawn, and it continued to fall until the end of the venesection. After venesection the venous pressure rose gradually, but in none of the cases did it return to the original value within 30 minutes. The changes in the blood pressure and pulse rate were variable and not related to the constant fall in venous pressure.

Transfusion

Observations were made on 30 unselected hospital patients (19 males, 11 females) suffering from secondary anaemias. In many cases the slight degree of anaemia would not have justified transfusion in the ordinary way. The chest measurements and approximate height and weight of all patients were recorded. They were allowed one pillow. This had no noticeable effect on the venous-pressure level. The preliminary rest period of 15 minutes was imposed and the venous pressure determined. The opposite arm was used for the transfusion, which was administered by gravity with the Medical Research Council giving-apparatus. Warmed compatible blood was given to all cases. The amounts varied from 500 c.cm. to 1,000 c.cm. In 4 cases the venous-pressure system blocked towards the end of the transfusion. The venous pressure was noted so far as was possible after every 50 c.cm. of blood had been transfused. In 5 cases the readings were continued at 5-minute intervals for 10 minutes after the end of transfusion and in a further 5 cases for 20 to 30 minutes. A rise of 20 mm. or less has been considered insignificant.

Venous Pressure and Amount Given.—Of the 30 patients, 19 showed a rise in venous pressure greater than 20 mm. H_2O, 10 no rise, and 1 a fall. In 13 cases the rise was between 20 and 50 mm. and in 6 cases between 50 and 85 mm. H_2O. In each of the 19 patients who showed a rise in venous pressure this increase was approximately proportional to the amount given (see Graph).

Venous Pressure and Transfusion Rate.—14 cases were transfused at rates varying from 7 to 15 c.cm. a minute, the average being 12 c.cm.: 8 showed no change in venous pressure, 4 a rise between 20 and 50 mm., and 2 a rise between 50 and 80 mm. H_2O. 12 cases were transfused at rates of 16 to 30 c.cm. a minute, the average being 20 c.cm.: 3 showed no change in venous pressure, 6 a rise between 20 and 50 mm., and 3 a rise between 50 and 80 mm. H_2O. 4 cases were transfused at rates of 30 to 45 c.cm. a minute, the average being 37 c.cm. All 4 showed a rise: in 3 the increase was between 20 and 50 mm. and in 1 between 50 and 80 mm. H_2O. There was apparently no constant relation between the rate of transfusion and the rise of venous pressure, although proportionally more cases showed a rise at the faster rates. Signs and symptoms suggestive of vasodilatation were encountered in 3 cases. In one of these the interpretation of the signs was complicated by the onset of allergic manifestations.



Graph of the venous-pressure changes during the transfusion of blood to 30 unselected hospital patients.

Case 1.—Gastric ulcer in a spinster aged 33, weight 7 st. 12 lb., height 5 ft. 4 in.; Hb 66%. The patient was given 540 c.cm. of blood at an average rate of 22 c.cm. a minute. The venous pressure at the end of transfusion showed a rise of 36 mm. H_2O. The blood pressure was 110/65 before and after transfusion. After 250 c.cm. had been given, flushing of the face and arms was observed and at the same time the patient complained of hotness of the face. This was followed successively by complaint of a throbbing sensation in the head and tingling of the lips. The flushing of the face and arms was present for several hours after the completion of transfusion. There was no rise in temperature.

Case 2.—A married woman aged 42; diagnosis—carcinoma of the rectum: weight 8 st. 4 lb., height 5 ft. 5 in.; Hb 78%. The patient was transfused with 950 c.cm. of blood at a rate of 16 c.cm. a minute. The venous pressure showed a rise of 64 mm. H_2O. The blood pressure before transfusion was 135/90 and immediately after transfusion 100/55. When 850 c.cm. had been given she complained of throbbing in the ears, followed in three minutes by palpitations, a feeling of fullness and hotness, and a generalized pumping sensation. After the onset of the symptoms, flushing of the face and both arms was noticed, and this lasted for 10 minutes after the completion of transfusion. There were no further signs or symptoms.

Case 3.—A married woman aged 61; a convalescent air-raid casualty: weight 7½ st., height 5 ft. 3 in.; Hb 66%. The patient was transfused with 990 c.cm. of blood at a rate of 15 c.cm. a minute. The venous-pressure rise was 38 mm. H_2O. After 450 c.cm. the patient complained of generalized hotness. After 600 c.cm. oedema of the right eyelid was observed, followed by flushing of the face. After a further 250 c.cm. the left eyelid also became oedematous, the flushing still being present. All signs had disappeared within 2 hours.

These 3 patients were transfused at rates varying from 15 to 22 c.cm. a minute (average 18 c.cm.). The rise in venous pressure varied from 36 to 64 mm. H_2O (average 46 mm.). In Cases 1 and 2 the venous pressure had risen significantly before the onset of signs or symptoms of vasodilatation, and remained steady in Case 1 and continued to rise in Case 2 until the end of transfusion. In Case 3 the venous pressure blocked just after the vasodilatation became evident.

The 10 cases in which recordings were continued after the end of transfusion showed a gradual fall in venous pressure, but in no case was there a return to the basal level within the next 10 to 30 minutes. In 26 of the patients blood-pressure readings were taken before and after transfusion. The changes after transfusion were variable and apparently not related to the frequent rise in venous pressure. Only minor variations in pulse rate were recorded, and these were inconstant.

Transfusion of Cases of Pulmonary Disease

Examination was made of 13 such cases—3 females, 10 males. The patients were allowed two flat pillows instead of one, as most of them found the supine position irksome. This position was maintained for at least 15 minutes before the vital capacity was recorded. The vital capacity was measured again after 500 c.cm. of blood had been given and at the end of transfusion (after 1,000 c.cm.). A Kendrick recording spirometer was used. In patients with rib resection the arm opposite the resected ribs was used for the venous-pressure estimation.

The transfusion rates given below are calculated from the actual time during which the 1,000 c.cm. of blood was being administered. However, it must be pointed out that after the first 500 c.cm. had been administered there was a time interval varying from 6 to 15 minutes (average 8 minutes), during which the vital capacity was being recorded and no blood transfused. The transfusion rates varied from 17 to 40 c.cm. a minute (average rate 23 c.cm.). The amount given was 800 to 1,000 c.cm. One case had 500 c.cm. only.

Vital Capacity.—With one exception every patient showed a decrease in vital capacity after receiving 1,000 c.cm. (1 case 500 c.cm.) of blood. The percentage reduction bore no constant relation to the original vital capacity. Clinically, 3 patients showed an increase of above 4 respirations a minute during the transfusion. One of these complained of a dry cough and another of dyspnoea during the night following the transfusion; the third patient, however, had no symptoms (Cases 12, 13, and 10, respectively; Table II). To exclude the possibility that the recumbent attitude was responsible for the reduction in vital capacity one normal subject and Case 10 of the pulmonary disease series assumed the posture for one hour without being transfused. There was no change in vital capacity in the normal subject, and only a 50 c.cm. drop in the other.

TABLE II.—*Effect of Transfusion of 1,000 c.cm. of Blood on Vital Capacity and Venous Pressure*

Case	Sex, Age, Diagnosis	Rate (c.cm. per min.)	Vital Capacity (c.cm.)		Venous-pressure Change during Transf. (mm. H_2O)	Transfusion Signs or Symptoms
			Before Transfusion	Reduction after Transf.		
1	M. 43 Empyema	33	2,450	150	+45	Headache
2	M. 44 Lung abscess	40	2,250	150	+77	Nil
3	M. 25 Pneumonectomy	20	1,900	350	+21	"
4	M. 52 Carc. bronchus	23	1,750	400	− 1	Nil. (Only 540 c.cm. blood given)
5	M. 59 Empyema	28	1,700	150	+81	Nil
6	M. 39 Pneumonectomy	22	1,450	150	+66	"
7	M. 50 Carc. bronchus	19	1,300	300	+33	"
8	F. 55 Empyema; rib resection	18	1,300	100	+ 6	Rigor 40 min. after transfusion
9	M. 21 Empyema; rib resection	20	1,250	200	−35	Urticaria, headache
10	M. 38 Pneumonectomy	25	1,250	300	+14	Urticaria
11	M. 21 Pneumonectomy	20	1,150	+50	−20	"
12	F. 45 Empyema; rib resection	17	1,100	300	− 5	Rigor 30 min. after transf. Dry cough during following night
13	F. 32 Pneumonectomy	18	750	200	− 5	Dyspnoea during following night

Venous Pressure.—Of the 13 cases of pulmonary disease 6 showed during transfusion a rise in venous pressure greater than 20 mm. H_2O, 2 a fall, and 5 no appreciable change. Again, in the 6 cases showing this rise the increase was approximately proportional to the amount given. None of these 13 patients developed signs or symptoms suggestive of vasodilatation.

Discussion

Normal Venous Pressure.—Lyons *et al.* (1938) consider that the normal venous pressure lies between 50 and 150 mm. H_2O. The same reference point being used, the cases in this investigation showed a similar range of venous pressure; though in one obese woman it was 167 mm. H_2O. According to Kroetz (1922) a raised venous pressure is common in obese subjects.

Venous Pressure During and After Venesection.—The constant and often striking fall in venous pressure during venesection (Table I) was, under the conditions of this investigation, unrelated to the arterial blood pressure or pulse rate. The subjects were a selected group in that all had previously undergone venesection. None had an established vasomotor collapse ("faint"), and so no record of the venous pressure during such an attack was obtained.

Venous Pressure During and After Blood Transfusion

Altschule and Gilligan (1938) in their study of the dynamics of the circulation used saline as a transfusion fluid and recorded the venous pressure at intervals. They found that it rose in the majority of cases transfused at rates above 20 c.cm. a minute, and this rise was proportional to the amount of fluid given. The venous pressure fell rapidly immediately after the end of these transfusions and reached the original level within 20 minutes. A rise in pulse pressure was commonly seen during transfusion. In all their cases receiving large-volume (1,000 to 1,500 c.cm.) transfusions a widespread flush was observed. The rise in venous pressure they interpret as being due to a failure of the peripheral vascular bed to dilate rapidly enough to accommodate the increased blood volume. Murphy (1941), who also used saline as a transfusion fluid, noted a rise in venous pressure during the first half-hour of transfusion. This was followed by a fall attributed by him to vasodilatation. There is no mention of this having been observed clinically, nor is it clear at what intervals the venous-pressure readings were recorded.

The present investigation, in which blood was used as a transfusion fluid and the venous pressure was recorded at frequent intervals, gave results similar to those of Altschule and Gilligan. As stated, 19 of the 30 cases had a rise of venous pressure greater than 20 mm. H_2O. This rise was approximately proportional to the amount of fluid given. The rate of transfusion played a less important part, but on the whole the faster rates showed greater venous-pressure rises. No correlation could be drawn between the venous-pressure rise and the age, sex, haemoglobin values, or chest measurements of the recipients.

In contrast to the findings of Altschule and Gilligan, the fall in venous pressure after the completion of the transfusion was slow. Moreover, in none of the 10 cases which were observed for the subsequent 10 to 30 minutes was there a decrease to the pre-transfusion level. This is probably due to the fact that blood was used as the transfusion fluid, and as a result the increase in blood volume was maintained for a much longer period than after the infusion of crystalloid solutions.

Symptoms and signs suggestive of vasodilatation were encountered in 2 patients who received 1,000 c.cm. of blood and 1 who received 500 c.cm. The rate of transfusion was greater than 15 c.cm. a minute and the rise of venous pressure greater than 30 mm. H_2O. However, other patients transfused at similar and faster rates and showing similar rises in venous pressure experienced no symptoms. All 3 patients were females of small stature. Although not beyond the limits of

chance it seems possible that vasodilatation was more likely to occur in an individual with a small blood volume.

The cases with a venous-pressure rise either had no clinical evidence of peripheral vasodilatation or only developed signs and symptoms of this after the rise was already considerable. The peripheral vasodilatation was not accompanied by the fall in venous pressure described by Murphy.

Venous Pressure During the Transfusion of Cases of Pulmonary Disease

These 13 pulmonary cases, transfused at rates varying from 17 to 40 c.cm. a minute, were comparable to 16 of the first group of 30 cases, in which the rates varied from 16 to 45 c.cm. a minute. In the latter group 13 of the 16 cases showed a significant rise of venous pressure, whereas only 6 of the 13 patients with pulmonary disease showed an increase of similar extent. Venous-pressure rises were apparently less frequent in the group suffering from pulmonary disease, but the number of cases examined was too small to warrant drawing conclusions. In this group, too, the venous pressure increased with the amount given. There was a slight decrease during the interval when the intermediate vital capacity was being recorded.

Glaser and McMichael (1940) found a significant increase in vital capacity following venesection. They calculated lung volume in each instance and converted the changes into equivalent changes in blood volume. From these figures they deduced that 47% of the blood withdrawn came from the pulmonary vascular bed. Conversely, during a rapid transfusion one might expect that an appreciable proportion of the increased blood volume would be accommodated by the lungs. Altschule and Gilligan recorded the vital capacity in 4 of their cases, but they could find no change. In the present investigation vital-capacity changes were studied in patients with pulmonary disease. Such cases were chosen because in subjects with an already reduced vital capacity any further reduction due to the accommodation of the transfused blood in the lungs would be more readily appreciated. In point of fact, a reduction was seen in every case except one, but in most instances the reduction was such that it could account for only a small proportion of the transfused fluid.

If it is accepted that reduction of vital capacity is due to pulmonary congestion, then the question whether this is brought about by heart failure from overloading the circulation must be considered. In such cases a systemic venous-pressure rise would be expected. However, the only cases (3 and 7) that showed a well-marked reduction in vital capacity and an increase in venous pressure had no signs or symptoms suggestive of cardiac embarrassment. Furthermore, the 2 cases (12 and 13) that did develop respiratory signs and had the greatest percentage reduction in vital capacity had no increase in venous pressure; and the 4 cases (1, 2, 5, and 6) that had the greatest rise in venous pressure had only slight reduction in vital capacity. In this series there appears to be no direct relation between venous pressure and vital capacity. The changes in vital capacity therefore cannot be ascribed to cardiac failure. The accommodation of the blood is perhaps best explained by alteration in the capacity of various parts of the circulatory system. The signs and symptoms of peripheral vasodilatation seen indicate that the capacity of the subpapillary venous plexus was being increased. The rise in venous pressure and the reduction of vital capacity show that the larger veins and the lung capillary bed respectively were accommodating the extra fluid.

Since this paper was written Sharpey-Shafer and Wallace (1942) have published observations on the rapid transfusion mainly of serum and saline (300 c.cm. to 2,100 c.cm.) to subjects without cardiovascular disease. Their results indicate that the venous pressure is raised when there is considerable retention of injected fluid. Dilatation of peripheral vessels was noted, and an engorgement of the pulmonary vessels was shown by vital-capacity and radiographic records.

Conclusions

The venesection of normal subjects is accompanied by a fall in venous pressure. During the following 30 minutes there is a return towards the original venous pressure, although this level is not regained in this period.

During the transfusion of blood to unselected hospital patients there is in the majority of cases a rise of venous pressure which is approximately proportional to the amount given, and occurs more frequently at the faster rates. Signs and symptoms suggestive of peripheral vasodilatation were encountered in 3 of the 43 cases transfused. In these cases vasodilatation occurred after a rise in venous pressure and was not followed by a fall.

After transfusion, patients suffering from pulmonary disease showed signs of pulmonary congestion, as revealed by a reduction in vital capacity. This decrease was not related to the venous-pressure changes.

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A WATER-BORNE AND MILK-BORNE OUTBREAK OF PARATYPHOID B INFECTION IN WORCESTERSHIRE

POTENTIAL DANGERS OF RAM-WATER SUPPLIES

BY

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This small but none the less interesting paratyphoid B outbreak occurred from June to Aug., 1941, in one of the rural districts of Worcestershire where I was acting medical officer of health. It comprised a total of 17 primary and secondary cases, notified over a period of two months, and is of particular interest owing to the extreme rarity of epidemics of paratyphoid B fever recorded in which the organism has been recovered from water and which, in that respect, may be regarded as water-borne. Since the water that was implicated was not actually a drinking water, and since the milk supply was apparently contaminated secondarily from this water supply, I prefer to designate this outbreak milk-borne and water-borne rather than water-borne.

It will suffice to state that cases of paratyphoid B infection had recently occurred in adjacent areas and that the alleged source of infection had been traced to cream buns. While every patient in the present outbreak denied consumption of cream buns during the incubation period of their attack, an indirect and subtle connexion probably existed between these two epidemics.

History of Onset of Outbreak and Events Leading up to the Investigation of Farm

My suspicions were aroused on the discovery that there was a common milk supply to the first two cases of paratyphoid B reported (Table, Cases 1 and 2). On July 2, accompanied by Mr. Owen, county sanitary officer, I visited the farm which supplied milk to both these cases in order to ascertain, in particular, whether there was any sickness among the milk-handlers. The machine-milker, who had had some slight symptoms for a week or two, was on July 4 proved to have a mild attack of paratyphoid B fever (Case 5). Incidentally, his son, who had been admitted to hospital on June 26 with a history of three weeks' diarrhoea, was later diagnosed as a case of paratyphoid (Case 6). This important information proved the latter could not have derived his infection from milk contaminated by his father. A search for missed cases, carriers, and other sources of infection was made.

This bottling establishment also received milk from six local producers, and, while paratyphoid B organisms were absent in all milk samples submitted for examination, they were present

in the *ram-water* used for dairying purposes. This ram-water was therefore the *missing link* we were seeking; for it was proved that the small son of the machine-milker contracted his infection from actually drinking the ram-water as it flowed in the gulley outside the dairy.

The machine-milker had ample opportunity of contracting paratyphoid from (1) his little son at home, (2) the tap-water in the cowshed, and/or (3) drinking the raw milk. At the same time in the process of hand-stripping he had plenty of opportunities of contaminating the milk himself. The milk could also have been contaminated by the ram-water delivered from the cowshed tap. The milk was supplied from this farm in bottles to the private customers and in bulk to a big depot in the district.

Common Milk Supply.—Some of the paratyphoid B organisms, originally discharged from the depot in the sewage effluent, evidently completed their circular tour in the suspected milk supply, and a total of 5 cases of paratyphoid B fever (Cases 3, 4, 7, 13, 17) were notified among its employees. The fact that no raw milk was served over the counter at the canteens accounts for the negligible number of cases at the depot. The canteen cook (Case 3) was one of the few persons with access to raw milk. Milk was available only in tea; however, the actual procedure of making tea varied somewhat at the several canteens.

Table showing Details of Cases

Case	Sex	Age	Paratyphoid B Widal Result "H"	Faeces	Urine	Clinical History	Remarks
1	F	6	+	−	+	"Cold" for 5 days. June 21: Fever, lassitude. 22nd: Diarrhoea. 29th: Rash, abdomen tumid, spleen +, liver +. "Typhoid state" for 2 weeks	Milk stated by parents always boiled previously. All family ate ice-cream twice a week
2	M	27	+	−	+	Indefinite. Jaundice since April 14. Stated illness began May 6. Fever June 13. Admitted hospital 20th. Epistaxis 28th. July 1: Tumidity, spleen +, liver +, "typhoid state" for one week. Jaundiced until about July 7	Date of onset very indefinite. At work until fever began. Very fond of raw milk
3	F	43	+	−	+	Poorly for about a week at work. June 24: Headache. 27th: Fever started; backache, headache, spleen +, liver +. No rash or tumidity	Canteen cook at depot. Handled uncooked food until evening June 27. Drank glass of raw milk daily
4	F	19	+	+	−	Sudden onset. Giddiness, pains in stomach and back. Frequent epistaxes June 21 to 28. July 1: Rash, tumidity, spleen +, liver +, constipation	Last worked at depot June 8. On holiday until July 1. No raw milk except in tea
5	M	26	+	−	−	Indefinite (1–2 weeks). Indigestion and backache. No diarrhoea. July 3: Headache; no rash or tumidity, spleen +, liver +	Machine-milker to bottling establishment. Father of Case 6. Fond of raw milk
6	M	2	+	−	−	Indefinite. Diarrhoea for 3 weeks. Admitted as suspected bronchopneumonia, diagnosed peritonitis until + Widal ("H" & "O") result July 5. Tumidity +, rash +, respirations rapid and shallow, with cough	Son of Case 5. History of having actually drunk ram-water. Drank raw milk
7	M	30	+	+	−	June 24: Epistaxis. 25th: Headache and lassitude. July 3: Diarrhoea and fever several days. 11th: Stiff neck, spleen +, liver +, rash +	No raw milk at depot except in tea; this had previously been added in urn
8	F	24	+	−	−	Sudden onset of intense headache, fever, and vomiting. July 6: Two rigors. 13th: Rash +	Stated she always boiled milk before drinking
9	M	1½	Ni	+	−	Diarrhoea since July 14. Fever since 18th. 22nd: Rash +, tumidity +	Admitted on + faeces (collected July 21, reported 23rd). Reputed to have last drunk raw milk from suspected source on June 18. Evidence inconclusive
10	F	18	+	+	−	July 22: Fever, headache, and aches in legs. 23rd: Rash +	Admitted as suspected case, being mother of Case 9. Blood culture − (collected July 23). Faeces + (received July 26). Leucocytes 11,550 (Aug. 7)
11	M	21	+	Nil	Nil	July 22: Headache, nausea, diarrhoea. 28th: Rash +, tumidity +, spleen +	Admitted on + blood culture (collected July 23, reported 28th). Died from haemorrhage Aug. 5. Uncle of Case 9
12	F	60	+	+	−	July 24: Sudden onset; headache, diarrhoea, vomiting. 25th: Collapsed with sudden acute abdominal pain and diarrhoea. 28th: Rash +, tumidity +	Blood culture − (collected July 25). Admitted on + faeces (collected 25th, reported 28th). Drank one glass of raw milk daily
13	F	21	+	+	−	Headache and pains in legs for 2 weeks; diarrhoea. July 26: Rash +. 28th: Epistaxis. 29th: Spleen +, liver +	No raw milk at depot except in tea. Last at work on July 21
14	M	55	+	+	−	Headache and febricula since July 22. Diarrhoea since 24th. Rash +. Aug. 1: Spleen +, liver +	Blood culture − (collected July 23). Grandfather of Case 9
15	F	10	+	+	−	Headache, fever, diarrhoea. Aug. 1: Spleen +, liver +	Blood culture − (collected July 23). Aunt of Case 9
16	F	11/12	+	+	−	Aug. 2: Fever for four days. 6th: Diarrhoea began. 8th: Fever, diarrhoea with mucus until 10th. Drowsy, tumidity +, green stools; rash +	All well-water boiled and all milk reported sterilized for child. Grandparents (living in same cottage) take milk from suspected farm; but child stated to drink milk from another source
17	M	58	+	−	−	Aug. 17: Sudden onset. Fever, diarrhoea, and vomiting 2 days; tumidity +. 28th: Admitted on relatively high paratyphoid B agglutinin titre	No raw milk at depot except in tea from urn. History T.A.B. inoculation (1917). Widal on Aug. 29 showed rising titre paratyphoid B agglutinins from 1/500 to 1/1,000 "H" in two days. [Typhoid agglutinin remained constant (1/125 "H")]

Events Leading to Investigation of Depot

Canteen Cook suffering from Paratyphoid.—On July 3 (i.e., the day before the Widal result of the machine-milker) Mr. Owen and I visited the depot to investigate a case of paratyphoid (Case 3) reported at one of the canteens. The patient was a cook who had been ill at work for about a week. It was evident that a salad-borne epidemic among the depot workers on that particular site was probable, and, in addition, a milk-borne epidemic among the farmer's private and depot customers was imminent.

Source of the Contaminated Ram-water.—One of the sources of the ram-water—two miles up-stream—was traced to the outfall of a sewage effluent from the depot.

Course of Streams Contaminated by Sewage Effluents

A complete survey was made of farms and dwellings situated along the course of streams receiving effluents from the depot sites. We first explored the course of the brook from which the bottling establishment derived its ram-supply. This procedure entailed a visit to every farm in order to ascertain certain facts. The following five questions were asked (the answers apply only to the *bottling establishment*):

1. *Whether any Case of Sickness had Occurred Recently.*—One case of sickness—i.e., the machine-milker (Case 5), who was an immediate contact of Case 6—which may be regarded as definitely water-borne in origin. The type of sanitary accommodation at the milker's home is a privy, and the bucket contents are disposed of by burial in the garden.

2. *Access of Milch Cows to Brook containing Effluent, on Account of Possible Source of Contaminated Udders.*—At the

time of the outbreak all 12 milch cows had access to the contaminated brook water.

3. *Use, if any, made of Brook Water.*—The ram-water supply from the brook was used in particular for washing the machine-milker's hands before hand-stripping, and each udder and teats before milking, and for supplying the cooler and washing out the cowsheds. In addition it was used at the farmhouse for washing up the plates and dishes.

4. *Drainage therefrom—as any Contributing Source of Pollution to the Brook above the Ram-intake.*—The sanitary accommodation, used exclusively by the farm household, consists of a W.C. (supplied by ram-water) that discharges into a septic tank. The point of entry of the drainage from the farm is definitely below the point of intake of ram-water.

5. *Any Special Action taken.*—Immediate action taken was: (*a*) sterilization of the milk (from July 4 to 22); (*b*) removal of cows from access to brook; (*c*) use of well-water only; (*d*) cutting off the ram (following the bacteriological report on ram-water sample—July 12). Remote action taken was: (*a*) after a period of 18 days sterilization of the milk was no longer enforced; (*b*) after a period of 9 days the farmer was permitted to use chlorinated ram-water for washing out the empty cowsheds and for the cooler; (*c*) to continue employing well-water for cleansing the udders and teats and for washing the milker's hands and the bottles.

Commentary on Case Histories

Two cases (16 and 17) are worthy of special mention. Case 16 (see Table) gives an interesting history of combined Sonne dysentery and paratyphoid B infection. The source of infection remains a mystery. Case 17 gave a history of absence from the depot for several days during the incubation period, so the probability is that the source of infection was not derived from the depot; in any event, milk may definitely be ruled out. It is reasonable to suppose that the remaining 15 cases were associated in some way with spread of infection from the ram-water and/or the milker who contaminated the milk, or by secondary infection from another case (e.g., Cases 10, 11, 14, and 15 secondary to Case 9). Case 9, in my opinion, was attributable to raw milk drunk on July 2.

Whether the machine-milker (Case 5) was infected by ram-water from the cowshed tap or by direct contact with his son (Case 6) during his illness at home it is impossible to prove. As the onset of illness in Case 6 was estimated to be about June 5, it is safe to assume that the ram-water had been contaminated with paratyphoid B organisms some days previously and that the incubation period was exceptionally short (Warren, 1941).

Record of Laboratory Findings in Connexion with Cases

Isolation of Paratyphoid B Organisms by Culture from Faeces and Urine.—In studying the bacteriological results obtained from samples of faeces and urine submitted to the laboratory (see Table), it will be noted that there were 3 cases reported with urine + only; 9 cases with faeces + only; and 4 cases with faeces − and urine −. The first 3 cases recorded suffice to show how essential it is for specimens of *urine* to be sent to the laboratory; this is particularly important in the case of men, who micturate more frequently than women and who have correspondingly fewer facilities for washing their hands after the act. On the other hand, of course, women urinary carriers with unclean habits may be a greater menace to public health on account of their food-handling occupations.

Agglutination Tests.—With regard to the determination of the paratyphoid B Widal results, positive titres were obtained up to dilution 1/250 "H," except in two instances: Case 15 was admitted to hospital on obtaining an end-point of 1/125 "H," as the child was obviously a secondary case due to infection from Case 9. In Case 16 there was not sufficient blood to proceed further with the dilutions; but there is no doubt about the diagnosis, for paratyphoid B bacilli were isolated from the faeces.

Blood Cultures.—Blood cultures were carried out on 4 patients in one family, the primary case of which—Case 9—was admitted to hospital on the recovery of paratyphoid B organisms from the stools. Only one positive paratyphoid B culture was obtained: this patient subsequently died.

Special Bacteriological Investigation

As a matter of exceptional interest, Mr. Monk submitted several cultures of paratyphoid B bacilli (through the medium of the Ministry of Health Regional Office) to Dr. A. Felix for phage typing. All these cultures, which were isolated during the outbreak, were tested against Vi phage preparations and found to react in an identical manner. The cultures were isolated from two patients, from the sewage effluent at the depot, and from the ram-water at the farm; and the result indicated that they all belonged to the same phage type.

Period of Survival of the Bacilli.—Using the dye method, it was estimated that the paratyphoid B organisms travelled through two miles of open stream for about 6 hours 7 minutes, and then through slightly less than 1/3 mile of piping for 34 minutes; the total distance from the sewage outfall at the depot to the tank at the bottling establishment taking 6¾ hours. These times and distances have been included in order to show the conditions through which *B. paratyphosus* B survived.

The Effluent Dilution Factor.—From observation alone it was evident that the effluent from the depot constituted a substantial fraction of the volume of the brook—even by the time it reached the point of ram-intake, which was situated two miles below the outfall. So I decided to estimate this dilution figure experimentally.

Determination of the Dilution Factor.—First of all it must be understood that the dilution of the effluent by streamlets within the precincts of the depot—over a distance of about 1/4 mile—may be regarded as negligible from a practical point of view. The degree of dilution undergone by the effluent at a point in the stream below the last tributary and above the position of the ram-intake was estimated. A dye was used for timing the speed of the stream. The true dilution factor was less than 1 in 4; or, putting the result still more dramatically, the effluent was diluted by slightly less than three times its volume of stream water along its course to the ram. Under weather conditions existing at the time of this experiment the dilution at the point of ram-intake was probably greater than just before the actual outbreak. I am indebted to Mr. W. Pembleton, the district sanitary inspector, for assistance in carrying out this investigation.

Revelations and Recommendations

The epidemic illustrates two important facts:

1. *Potential Dangers of Hydraulic Ram-water Supplies under Wartime Conditions.*—Sewage effluents must find some outlet for discharge, and, in rural districts, brooks may be regarded as their natural course. The potential risk run by persons using hydraulic ram-water for domestic purposes must therefore be apparent, even though it may not be very significant. However, when an individual happens to be a food-handler, the health of a community may be endangered. Therefore, every farmer making use of a ram-water supply for cleansing the cowsheds and dairy must regard this water as potentially dangerous—for brook water is liable at any time to pollution. Ram-water really consists of a mixture of samples collected from a brook over a continuous period. Any sample taken direct from a contaminated brook may contain no harmful organisms, whereas a specimen of ram-water from the same brook is more likely to do so, for it is an accumulation of an infinite number of samples. This fact is pointed out as it is not generally realized that ram-water is even more unsafe than brook water *per se*. All users of ram-water should therefore take warning of the dangers of ram-supplies—especially under wartime conditions.

2. *The Importance of a Primary Planning Co-operation.*—During wartime large factories and works of every description are springing up in rural districts all over the country. They are built so rapidly and so secretly that the powers-that-be seldom consult the local authority on matters regarding the discharge of their sewage effluents. Co-operation between any particular branch of the Services concerned and the sanitary authority is essential, and, in order that the local knowledge of the latter shall be employed to the mutual advantage of both parties, it must start at an early stage in the planning of the sewage works and before the actual building has begun. This planning co-operation is of particular importance in rural districts, where there is danger of the effluents contaminating brooks used for dairying purposes; for the local sanitary

authority is the one and only body possessing that local knowledge of the district so essential before the plans are made. In the interest of general public health it is vitally important that powers over which the civilian authorities have no control should not discharge their sewage effluents into streams in dairying localities without this primary planning co-operation with the local sanitary authority.

Conclusions

The outbreak was due to a combination of factors, the chief predisposing causes being: (1) a hot spell and drought for the previous six weeks; (2) the recent incidence of paratyphoid fever in surrounding districts; (3) the inadequate dilution of the effluent from one of the sewage works at the depot; and (4) the comparative proximity of sewage outfall to ram-intake.

I am very grateful to Dr. Wyndham Parker, county medical officer, for his valued advice on all matters and for kind permission to publish this article. Thanks are due to the local sanitary staff and to Mr. R. W. T. Owen, county sanitary officer, for his indispensable support in carrying out the investigations. I am indebted to all the medical superintendents of isolation hospitals and the district medical officers of health who were good enough to supply me with clinical data, and to the local general practitioners for taking such prompt action to establish an early diagnosis in suspected cases. Grateful acknowledgment is made to Mr. H. E. Monk, county analyst and bacteriologist, and to his staff, for their enthusiastic co-operation. I also wish to express my appreciation of Prof. J. F. D. Shrewsbury's kindly help and criticism.

FATAL PHOSPHORUS POISONING FROM AN EXPLOSIVE BULLET

BY

A. J. BLAXLAND, M.S., F.R.C.S.

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It is well recognized that certain types of incendiary bomb may cause local damage to skin or a wound from phosphorus contained in them, but, so far as I am aware, there is no appreciable risk of poisoning from absorption in these cases. The proportion of phosphorus present is, I understand, quite low—only about 4%. The risk of absorbing a lethal amount of phosphorus is apparently very much greater in penetrating wounds caused by a certain new type of explosive bullet. In the case recorded below there seems to be no reasonable doubt that death was due to phosphorus. Similar cases may have occurred without recognition of the cause of death, and I feel that it is important that the medical profession should be on the alert for them.

Case Report

A Canadian airman navigator aged 24 was wounded in the early hours of Sept. 14 in action over enemy territory. His aeroplane landed at a near-by aerodrome, where he was given morphine and his wound was dressed with sulphanilamide. He arrived at the Norfolk and Norwich Hospital at 9 a.m. There was a ragged entrance wound on the outer aspect of the left thigh, 2 in. long. His abdomen was rigid and tender, with dullness over the lower half. He was suffering from extreme shock. Pulse 144; B.P. 65/0. Three pints of serum were given intravenously and his B.P. gradually rose to 120/60. A radiograph showed a metallic foreign body in the centre of the abdomen, a punch fracture of the wing of the left ilium, and also some small metallic fragments in the thigh above the entrance wound and below the fracture.

Operation was begun at 11.30 a.m. The abdomen was opened and over 2 pints of blood mopped up. A ragged portion of a distorted bullet was found embedded in the upper part of the mesentery. This was extracted, and large torn branches of the superior mesenteric vessels were ligated. A transverse tear in a loop of jejunum was sutured and invaginated. There were no other intra-abdominal injuries, but some scattered fragments of bone were present in the subperitoneal layer of the abdominal wall on the left side. The abdominal incision was closed without drainage. The entrance wound in the left thigh was then enlarged up to the site of the penetrating fracture in the ilium, the edges of the skin and damaged muscle were excised, and some loose debris wiped away with gauze. While doing this it was noticed with astonishment by myself and my assistant that the wound emitted a visible vapour. This vapour was then found to possess the smell characteristic of phosphorus. The wound was impregnated with sulphanilamide powder and lightly packed with gauze. My first impression on smelling the vapour was that it was due to a tracer bullet, but examination shortly afterwards in a dark room failed to demonstrate any phosphorescence. During the operation a blood transfusion of the same group (O) as that of the patient was started, and it was continued until he had received 3 pints. The blood pressure at the end of the operation was only 84/40, but by 8 p.m. it had risen to 134/60.

The following day the patient's general condition was fair, with some vomiting. On the 16th he had improved, and his general condition was satisfactory: no vomiting; abdomen soft; no gas in the wound or spread of infection. On the 17th he was not so well, and was slightly restless. Abdomen soft; no vomiting. The wound in the thigh was unhealthy. On the 18th he was obviously deteriorating and very ill—restless and semi-comatose. There was a lemon tint in the skin. A blood count showed 3,000,000 red cells with haemoglobin only 38%. A pint of blood was given. No urine had been passed for 24 hours, and a catheter withdrew less than 2 oz. The blood transfusion was followed by a continuous drip of saline and dextrose. The abdominal wound broke down and was strapped.

On the 19th the patient was comatose. In spite of the many pints of fluid given intravenously the anuria continued, not more than 1½ oz. of urine being withdrawn by catheter. Examination of the blood showed that the haemoglobin had risen to 58%. The blood urea was 453 mg. per 100 c.cm. His pulse remained comparatively slow—92 to 100 during the day—and was of quite good volume. He died at 1.50 a.m. on the 20th—that is, 6 days after being wounded.

Report on the Necropsy, by Dr. G. P. C. Claridge, Hon. Pathologist to the Norfolk and Norwich Hospital

At the post-mortem examination a gaping wound was found in the left thigh from which there was a track up into the tissues of the left flank passing through the iliac bone. The edges of this wound showed some necrosis, but not more than one often sees in these war wounds. The peritoneal cavity was clean and the stitching of the intestine sound. The liver was not enlarged, but on section had a homogeneous appearance and the cut surface was of a dull yellow colour. Apart from some slight swelling of the kidneys there was nothing of note in the other abdominal and thoracic organs.

Microscopical sections of the liver show extensive necrosis with fatty degeneration; the lobules cannot be identified, while the liver cells, which can still be recognized as cells, have a hazy outline with absent or shadowy nuclei which take the eosin stain, and a granular and highly vacuolated cytoplasm. Sections of the kidneys show the changes of catarrhal nephritis, the cells of the convoluted tubules being enlarged, granular, and in many cases necrotic. These changes in the kidneys are in themselves insufficient to account for the anuria. The gross destructive lesion of the liver is typical of acute phosphorus poisoning.

Comments

The rapid deterioration in the patient's condition after making good progress for the first three days, with the local condition in the abdomen and thigh satisfactory, was most puzzling at the time. The anuria and uraemia led me to surmise that it might be caused by some incompatibility of blood, although there were no symptoms to suggest that during the transfusions. The microscopical appearance of the kidneys makes it unlikely that incompatibility had any part in the fatal result.

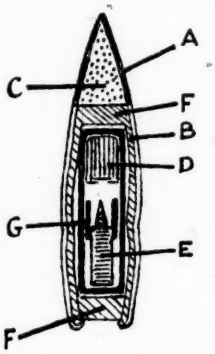
The condition of the liver is not readily explained by anything other than phosphorus poisoning. If that explanation is correct, the important point arises as to what could be done to eradicate or counteract the poison in similar cases in the future. A more extensive excision of the damaged area than usual is indicated, and the application of a chemical antidote. I am ignorant as to whether copper sulphate would be of value. I believe that its use in the treatment of phosphorus burns of the skin is mainly as a colour index of the exact position of the phosphorus, and that the phosphorus has to be scraped off and further copper sulphate applied, to discover if there is any more to remove.

Apart from the evidence of necrosis of the liver and the presence of the vapour in the wound, with its distinctive smell, I have recently collected further and more convincing proof that this case was one of phosphorus poisoning. Lieut. K. M. Wheeler, R.E., has, with much kindness, great enthusiasm, and some risk to himself, done some research work for me. He has matched the distorted remains of the bullet with some identical bullets from a batch found on a wrecked German plane. His investigation proved it to be an explosive bullet—containing a charge of high explosive and also 3¼ gr. of phosphorus—which is double the minimum fatal dose recorded (Sydney Smith, *Forensic Medicine*, 4th ed., p. 472). A replica of the striker of the detonator in the bullet was found in the portion of bullet removed from the patient; and

also traces of phosphorus were detected on this portion by chemical tests. The radiographic evidence of minute portions of metal in the thigh and the ragged large entrance wound suggest that the bullet exploded in the tissues of the thigh, probably on striking the iliac bone, thus releasing and scattering the concentrated phosphorus.

A DESCRIPTION OF THE BULLET, BY LIEUT. K. M. WHEELER, R.E.

It is a 0.312 Mauser pattern bullet. Its total weight is about 10.6 g. The outer case of the bullet is in two layers, except the nose—the outer layer of hardened iron with copper plating (A), the inner layer of lead (B); the whole of which encloses, in the nose of the bullet, a concentration of phosphorus (C); and in the main body a brass sleeve containing a detonator (D), of high explosive, actuated by a striker (E). F, F are lead plugs, and G is a safety device. The total quantity of phosphorus is the equivalent of 3.254 gr., most of which is in the nose, although some seems to have crept up between the inner and outer skins of the casing.



I wish to acknowledge my indebtedness to Lieut. Wheeler, whose research work largely solved the mystery of the death; to Dr. Claridge for his help and advice; to Dr. John Williams of Messrs. Reckitt and Colman Ltd., who supplied the chemical data; and to my house-surgeon, Mr. W. P. Hirsch, who assisted me at the operation and was responsible for the after-treatment and clinical notes.

Medical Memoranda

Urticaria with Pigmentation as a Sequel of Scabies

As an unusual sequel of scabies the following case may be of interest.

CASE RECORD

In February of this year an airman aged 20 complained of paroxysmal irritation, localized to small pigmented papulo-macules, which when rubbed became elevated as in urticaria pigmentosa. His history was that in July, 1941, he was treated with sulphur ointment for scabies. As the irritation did not disappear he then received treatment with benzyl benzoate on four different occasions up to September, 1941. Late in August, 1941, he noticed that the irritation was confined to a small, flat, brownish pigmented lesion on the site of an old scabietic burrow on the left axillary fold. A week or so later he noticed similar pigmented lesions on the abdomen, left upper arm, and trunk; all were about the size of a silver threepenny-piece. The irritation was paroxysmal, in bouts, nocturnal and diurnal, lasting some minutes and confined to the lesions, which, when rubbed, became definitely more prominent and raised above the surface. This swelling would last a few minutes and then decrease, with a consequent extinction of the irritation. The majority of the lesions were on the abdomen. There were also a number of small dark-brown pigmented non-hairy moles on the abdomen and arms which had been present since birth.

The patient was above average intelligence and there was no evidence of a psychogenic factor. He was medium in colour of complexion and hair, and stated that he sunburned slowly. As a child he had had "heat spots" occasionally, after eating porridge. There was no dermographism.

During the four months under observation there has been some decrease in the pigmentation. The urticarial response and the paroxysmal irritation are now absent. Biopsy showed a consistent intracellular increase in the melanin throughout the lesion in the lowest two cell layers at the base of the stratum malpighii; melanoblasts were normal in distribution and pigment content. The epidermis and dermis were normal in thickness. The hair follicles, sweat glands, and sebaceous glands were all normal, but around some sweat glands, and around all capillaries, superficial and deep, was a definite round-cell infiltration; no eosinophils were seen. The cells lining the capillaries gave the impression of slight swelling, but all were empty of blood.

COMMENT

The absence of mast cells in the biopsy excludes urticaria pigmentosa. One would suggest that the lesions represent a peculiar sensitization response to local results of scabietic infestation.

I wish to thank Dr. J. T. Ingram of Leeds for his advice.

GEOFFREY A. HODGSON, D.M.,
Major, R.A.M.C., Dermatologist.

Reviews

DRUGS OF ADDICTION

National Research Council. Report of Committee on Drug Addiction 1929-1941, and Collected Reprints 1930-1941. (No price given.) Washington, D.C.

This huge volume of 1,581 pages contains, besides the report of the committee, reprints of numerous papers embodying the results of researches made on the chemical, pharmacological, and clinical aspects of addiction during 11½ years. To read it through would be, as Sir Thomas Browne might say, "a work not to be performed on one leg," though only a captious critic would complain that "more authors are quoted in one work than are needed in a whole world." As a book of reference it will be found invaluable, and it is indispensable as an exhaustive record of the very important researches on addiction which have been carried out in the U.S.A. during more than a decade. The hope expressed that the foundations thus laid "may be of value not only to contemporary research but to posterity" can fairly be grouped among those hopes which are "sure and certain."

It is, of course, impossible to do adequate justice to a book so rich in content within the exiguous space at our disposal. While the chemical and pharmacological studies will deeply absorb specialists in those branches, it is to the clinical papers that the practising physician will chiefly turn. As regards the two former aspects, it will perhaps suffice to say that, while the ultimate goal is still far off, proof has been afforded of the possibility of so manipulating the morphine molecule as to produce substances which exhibit, in a certain degree, less of the undesirable and more of the desirable effects of morphine. Especial mention may be made of two morphine derivatives, desmorphine and metopon, which have been found to possess greater analgesic powers than morphine and, as regards the latter, less liability to addiction. Hopeful as such results seem to be, yet the conclusion is regretfully reached that while one of the two (metopon*) is an excellent analgesic for chronic pain and has promise of being a real addition to our armamentarium—especially in the field of terminal cancer—yet morphine, in spite of its disadvantages, still holds its position as the most satisfactory phenanthrene derivative in the majority of cases when used with due caution. A promising field of research has also been opened up among the amino-alcohols, for it has been found that the phenanthrene nucleus is not essential for analgesia. It was found also that the most convenient method for assessing the addiction factor in new compounds was observation of their capacity or incapacity to maintain pre-established physical dependence upon morphine.

Coming to the more clinical aspects of addiction, Treadway estimates the proportion of addicts to the general population in the U.S.A. as about 1 per 1,000. Himmelsbach and Small, in another paper, usefully clear the ground by demonstrating the uselessness of certain remedies much lauded by some. Thus, e.g., "rossium," the barbiturates, and insulin were found to be without any real beneficial effect upon the abstinence syndrome. Kolb, in another paper, gives reasons for his belief that belladonna treatments, pilocarpine, the endocrines, and immunity treatments are of little or no value, and, indeed, states that all treatments based upon theories of addiction mechanism have been failures, since that mechanism still remains obscure. All may not go with him quite so far, but his arguments deserve careful study. The chief positive contributions to treatment are contained in the papers by Kolb and Ossenport and Kolb and Himmelsbach which describe the method used at Lexington Hospital. The drug is first withdrawn, then physical and mental rehabilitation is undertaken within the institution, and, lastly, the patient is adjusted to outside conditions in preparation for his return to society. Intensive psychotherapy is given only to selected patients, but occupational therapy, recreation, and a grade of custody or supervision loom large. Drugs play a minor part. As regards withdrawal, the plan recommended for the generality of cases is a rapid but not abrupt withdrawal, helped out sometimes by a few

* Metopon (methyldihydromorphinone) is, however, not yet available commercially.

doses of codeine for two or three days. The authors deprecate abrupt withdrawal in addicts with strong habits as cruel, dangerous, and unnecessary.

An extremely valuable book would, however, be even more valuable if someone could be found to undertake the prodigious task of compiling an adequate index. Perhaps such an index could be issued as a supplement to the volume? It would be an inventory of a real treasure house.

VAGINAL HYSTERECTOMY

Vaginal Hysterectomy. By James William Kennedy, M.D., F.A.C.S., and Archibald Donald Campbell, M.D., F.R.C.S.(C.), F.R.C.O.G., F.A.C.S. (Pp. 495; fully illustrated. $10.00 or 60s.) Philadelphia: F. A. Davis Company; London: H. K. Lewis. 1942.

It is quite customary nowadays for medical books to be written by two authors, but it is unusual for two recognized experts in different countries to combine to produce a monograph on such a special subject as vaginal hysterectomy. This, however, has been done by Kennedy of Philadelphia and Campbell of Montreal, and may be considered to be a sign of the times illustrating the reciprocal value of the lease-and-lend policy. The appropriation of 495 pages for such a monograph might seem to be superfluous, but this is in nowise the case. The operation of vaginal hysterectomy is one that is comparatively seldom done in this country at the present time, though it had many advocates in the past; it is, however, much more frequently performed in Canada and the United States and on the Continent: it is, therefore, most opportune that this monograph should be published to allow British gynaecologists to revise their ideas as to the suitability of the operation and to be able to appreciate the full details of the operational technique as practised by these two experts.

The book begins with an interesting historical account of the operation, interspersed and enlivened by many interesting anecdotes; this is followed by Kennedy's account of the clamp method of vaginal hysterectomy which he and his predecessor, Price, have practised for sixty years; he goes into the indications, operative details, post-operative treatment, and complications very fully, and, though all the indications would not meet with universal approval, many warrant very careful consideration by British gynaecologists. His mortality rate of under 1% in 4,000 cases is in itself sufficient reason for a more extended practice of the operation. We note that he has never encountered a death from embolism following this operation. This would also seem to refute condemnatory statements regarding the operation, which Kennedy states are made by those not accustomed to its performance, but he lays himself open to a similar criticism for his remarks on the Manchester operation for prolapse. Vaginal hysterectomy would seem to be of especial value in cases of carcinoma corporis, pre-cancerous cervix associated with menorrhagia, and procidentia. Campbell gives a very full account of the anatomy of the pelvic floor, especially with regard to the aetiology of prolapse, which he discusses thoroughly; he then goes on to describe in detail his admirable operation of vaginal hysterectomy with sutures in association with pelvic floor repair for prolapse. From the point of view of one who has seen Campbell at work this is an operation which is well worth detailed study by all gynaecologists who are unacquainted with it.

The beautiful binding, the luxurious paper, and the excellent printing give the book a pre-war appearance which is most refreshing and stimulating, but its chief attraction is the beautiful and detailed illustrations, of which there are 120: these for the most part are whole plate and are so exquisitely drawn as to make the steps of the operative technique easily understandable, for each step is most adequately depicted.

It is essentially a book for the practising gynaecologist, who will be well repaid by its purchase.

LOCAL GOVERNMENT

The Municipal Year Book. (Pp. 1,450. 40s.) London: The Municipal Journal Ltd. 1942.

This encyclopaedia of local government administration makes its appearance again, apparently undiminished in bulk, and as informative as ever. It is not as rich in statistics as were pre-war issues, but, then, the value of statistics is mainly for comparative purposes, and the war has made comparisons useless. To make up for the loss of some sections, others having a close bearing upon wartime administration have been introduced, including war damage, planning, building, and reconstruction. If the reader wishes to look up recent legislation affecting local government, or defence regulations, or law cases, or important official documents, this volume will prove an unfailing source of reference. Similarly if anyone is curious to know the constitution and personnel of urban and rural councils from Orkney to the Isles of Scilly, or particulars of corporation properties, housing schemes, rates, or indebtedness of boroughs from Lowestoft on the east to Aberystwyth on the west, this work is as ready with its information as a cash register.

In the section devoted to public health services there appears a useful directory of orthopaedic centres and fracture departments and clinics. There are eight orthopaedic centres in the London sectors and ten in other regions. The fracture departments "A," which are suitable for long-stay cases, number 55; the departments "B," which are for ambulatory and short-stay cases, number just 200; and the fracture clinics "C," for out-patient treatment, just over 100. An outstanding feature is the number of "B" departments in Yorkshire and Lancashire—more than two dozen in each county. Another feature of this section is a list of the institutions which have been "appropriated" under the Local Government Act, 1929. Those appropriated as general hospitals number 32 in London, 15 in the neighbouring counties of Middlesex, Kent, and Surrey, but only 23 in other county areas of England and Wales, and 54 in the county boroughs.

This work of reference, while severely matter-of-fact, does manage to convey the fascination of local government, with its many fingers reaching down into the life of the community, more intimate and in some ways more interesting than national politics. It also illustrates the vast amount of public service, largely unpaid and unacknowledged, which local government is able to enlist, and the valiant part it is taking in the organization of the country for war and for the tasks of peace that will come after it. We hope the future historian of these times will not be so occupied with Westminster and Downing Street as to forget the hundreds of civic centres and town halls.

Notes on Books

The *Medical Progress Annual*, Vol. III, 1942 (Baillière, Tindall and Cox; 27s. 6d.) is a reprint of 52 articles which appeared in the *New England Journal of Medicine* during the successive weeks of 1941. The standard of editorship and production of the book is high. The articles range over the whole field of the progress of medicine in its widest sense, and, being by chosen authorities, they are almost uniformly excellent. Taken in a dosage of one a week they might well have been stimulating, but it must be confessed that they make heavy reading when combined in one volume. Readers who are not under the spell of local patriotism will question the wisdom of a publication of this kind. Medical progress is already reported in medical annuals, yearbooks, annual reviews, and monographs, at a length which is hardly justified by the pace of significant discovery. Many British readers will feel that, if any addition is necessary, a system of abstracting, such as they have learnt to appreciate in the *Bulletin of War Medicine*, is a better way of classifying advances and giving prompt and wide circulation to what is important.

Preparations and Appliances

A SYNTHETIC MORPHINE SUBSTITUTE

Roche Products Ltd. recommend for trial a synthetic morphine substitute called pethidine. It is closely allied to morphine in composition, and is issued in 25-mg. tablets and 50-mg. ampoules. It may therefore be administered intravenously (1 to 2 c.cm. over 3 minutes) for the immediate relief of pain, as well as orally (25 to 75 mg. two or three times a day). It is claimed that pethidine will relieve pain without impairing consciousness or co-ordination, and that it is valuable in renal or biliary colic because of its anti-spasmodic activity. It is comparatively free from toxic effects, though medullary depression and other side reactions may occur on intravenous injection; nevertheless it would seem to have many of the properties of morphine without certain of its disadvantages.

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INFANT AND MATERNAL MORTALITY

A number of thorough investigations have been made in recent years into the causes of death of mothers in childbirth and of infants before the end of the first month. It is common knowledge that neonatal mortality has not shared in the general fall in the infant mortality rate and that the maternal death rate—at least until the introduction of the sulphonamides—has remained for many years at a disturbingly high level. Some of the reports based on these inquiries lie on dusty shelves, but others were used as a framework for legislation. The latter tended on the whole to emphasize the technical aspects of the subject, leaving the layman with a vague, comfortable feeling that all would be well if we had better ante-natal services and more competent midwifery. The most recent report[1] blows a cold east wind on these delicate illusions by taking into account the wider biological and social implications of child-bearing. In this investigation, which comes from the Department of Physiology of Durham University, Mrs. C. M. Burns reports the results of an exhaustive study of the records of health visitors in the administrative county for the years 1930-7. Its main object, as the author puts it, is to consider the relation of the age of a woman to her fitness for motherhood, such fitness being measured by the chances of survival of mother and child; this necessarily implies a study of the number of children born and the rate of breeding. The subject-matter falls roughly into two parts, the first dealing with the history of some 17,000 children born in the year 1930, and the second with the maternal deaths which occurred during the whole period under review. The age and parity of the mother were known in over 15,000 cases, and from these records it has been possible to draw conclusions which are not made less positive by cautious insertion of the phrase "it would seem to be."

In a recent work Julian Huxley says: "If we wish to work towards a purpose for the future of man we must formulate that purpose ourselves. Purposes in life are made, not found." The essay which Mrs. Burns has written is an illustration of this truth, and it is rightly described as "a study in human responsibility." Many of her conclusions lay a new stress on what is already accepted, but they are set in the form of a challenge to action. We know, for example, that the lowest infant death rates are found in first, second, and third children born to mothers between 20 and 35, and fourth and fifth children to mothers between 35 and 40; and that the infant death rate is abnormally high among *first* children born to mothers under 20 and over 30. The age of a mother at the birth of her first child is therefore a factor of prime importance in a forward social policy, and it is evident that this biological consideration is relatively unaffected by improved medical, nursing, and social services. The only remedy is to encourage marriage and the foundation of a family at the most favourable age. The second major influence on the preservation of infant life is the spacing of the family. It is abundantly clear from the figures presented that a rapid succession of pregnancies means a high death rate, and once again biological causes predominate, and we cannot expect to secure great advances without taking these into consideration. As the author says: "It is a mistake to lose sight of the woman in the mother. Many women are more in need of ante-conceptional than ante-natal advice, and any service that proposes to care for maternity must not relinquish responsibility at the end of ten days after childbirth, but must be responsible for the woman's health throughout the entire reproductive period."

The Durham investigation brings out a number of other facts of great interest, many of which are applicable to the country as a whole. It shows that, contrary to the general belief, first children, once they survive the perils of birth, are just as healthy as the rest. The late children of large families, however, have a high death rate at all stages—infancy, childhood, and adolescence. The relation of infant mortality to social conditions is also discussed, but the material is not well adapted for firm conclusions. As might be expected, there is a relatively high death rate in overcrowded homes, but the figures suggest that the size of the family rather than the overcrowding as such is the harmful factor. First children living under the same overcrowded conditions as seventh children had the death rate of their own birth rank, not the higher figure of the late child in a large family. It is pointed out, however, that the inquiry applies to a county area and not to the slum conditions of a great city. When we come to the discussion of maternal deaths the same general conclusions hold good. The death rate among women bearing their first child after the age of 30 was four times that of primiparae between 20 and 25. Where marriage or the first childbirth is postponed till after 30, not only is the first birth relatively dangerous but all subsequent births are associated with a maternal death rate relatively high for that stage of the family. "This in part explains the absence of improvement in the figures for maternal death rates in the more fortunate classes, who on the whole marry later than the working classes." Unfortunately, late marriage is no longer the monopoly of the well-to-do; it is spreading among the capable and the prudent in all trades and professions which demand a period of preliminary apprenticeship. These groups suffer a double disadvantage—late marriage and small families—and the author suggests that these groups are faced with extinction.

Two broad considerations of policy emerge from this inquiry: first, that not enough stress has been laid on the biological factors concerned in maternal and infant mortality. What are we going to do in order to secure that marriage and the foundation of a family take place at the best biological ages (i.e., 20–25)?; and, How are we to achieve better spacing of families—which counts so much towards the health and efficiency of the mother? The second consideration is still more fundamental, but it depends to some extent upon the first: How are we to prevent the breeding of the unfit? Mrs. Burns says that "in this country it is already broadly true that only those who are unable to look after themselves are increasing their numbers," and quotes (with apparent approval) a statement of the Chief Medical Officer to the Ministry of Health (1935): "We must not overlook the fact that, if the nation saves infant life on this scale, it must not be surprised if many weakly and perhaps even defective children are saved, which tend to increase the number of unfit." Elsewhere Mrs. Burns speaks of infant death as a process of weeding out the unfit, as though the survivors must inevitably be healthy. But is there evidence to suggest that the appalling death rates of a century ago were merely the weeding of a garden? We know very little of morbidity figures except in relation

[1] *Infant and Maternal Mortality in Relation to Size of Family and Rapidity of Breeding. A Study in Human Responsibility.* By C. M. Burns, M.A. J. M. Carr, 204, Westgate Road, Newcastle-upon-Tyne. (5s.)

to infectious disease, but all the keenest observation of the period indicates that the quantity of ill-health was then greater both absolutely and relatively to the number of deaths. Records of death are a small and somewhat biased sample of the total volume of sickness, and one may venture to doubt whether, as stated in the concluding remarks by Prof. David Burns, the misfits of civilization, who at present form about 10% of our population, will form 30% of the next generation. We have only just begun to try the effect of education and social welfare on the bulk of our people.

THE ANTI-PERNICIOUS-ANAEMIA FACTOR

The therapeutic triumph over pernicious anaemia must remain incomplete until it is found possible to produce this disease experimentally in animals. Only in this way will it be possible to standardize efficiently preparations used in treatment. Perhaps of more fundamental importance is a closer understanding of the deranged physiology of hyperchromic anaemias. The initial problem, still unsolved, is to determine the location of the intrinsic haemopoietic factor in the stomach. Meulengracht's investigation[1] indicated that preparations made from the pig's pylorus were much more potent in the treatment of pernicious anaemia than those derived from the cardia, while extracts of the fundus were completely inactive. Total gastrectomy, however, failed to produce a pernicious-anaemia syndrome in the pig, dog, or monkey, even after the subsequent institution of defective diets, the administration of poisons such as carbon tetrachloride, or infestation with *Bothriocephalus latus*.[2] In this series of experiments it was found that hypochromic anaemia developed much less frequently when the stomach, although isolated from the rest of the alimentary tract, was left in the body, a fact which favours the hypothesis[3] that the stomach may have some hormonal function in haemopoiesis. The failure to produce a condition of pernicious anaemia by gastrectomy naturally led to the consideration of the possibility that some region producing the anti-anaemic factor was still functioning in the body. Attention was then focused on that part of the duodenum containing Brunner's glands, which resemble the glands in the pylorus. Sharp and his colleagues,[4] indeed, found that the dried duodenum of the hog had a therapeutic effect on pernicious anaemia similar to that of preparations of dried stomach. This observation was confirmed by Meulengracht.[5]

Petri and his colleagues[6 7] have studied this aspect of the problem of the experimental production of pernicious anaemia by means of selective resection of various regions of stomach and duodenum. Three types of operation are reported: (1) total gastrectomy with resection of the Brunner-gland area of the duodenum, (2) resection of pylorus and Brunner-gland area, and (3) resection of pylorus and entire duodenum. In none of the animals, pups and adult dogs, was the picture of pernicious anaemia produced, though in all there appeared symptoms of pellagra, relatively mild in the adult animals but much more severe and at times rapidly fatal in pups. If Castle's view as to pathogenesis is accepted, the attempt to produce pernicious anaemia failed because the experimental procedure did not completely destroy the ability to form the intrinsic factor. Uotila,[8] indeed, has already shown that preparations derived from the small and large intestine, but especially the ileum, of swine did possess some anti-pernicious-anaemia factor, though they were not so potent as those made from pylorus or upper duodenum. Accordingly Petri and his co-workers tried to produce pernicious anaemia by resection of the pylorus, the Brunner-gland area, and the distal two-thirds of the small intestine. This resulted in the appearance of a macrocytic hyperchromic anaemia, with pathological changes in the central nervous system, but there was no marrow hyperplasia and recovery was spontaneous. Accordingly, so far as experimental pernicious anaemia is concerned, another failure has to be recorded, but the morbid condition brought about may be included in that group of diseases such as tropical macrocytic anaemia, *Bothriocephalus latus* infestation, and sprue, and indeed may be identical with the pellagrous syndrome associated with hyperchromic macrocytic anaemia. It is possible that the inability to induce pernicious anaemia in dogs is due to the choice of unsuitable combinations of resections or to the need for associating dietary deficiency, such as B-hypovitaminosis, with gastro-intestinal interference.

It is well known that the haemopoietic factor, presumably manufactured in some region or regions of the alimentary tract, is stored in the liver. The anti-pernicious-anaemia potency of the liver of any animal is therefore an indication of the amount of haemopoietic factor formed and absorbed. Petri and his colleagues[9] have utilized this in devising a series of investigations wherein was estimated the therapeutic efficacy on pernicious-anaemia patients of livers from animals that had survived for at least 166 days after various sections of the alimentary tract had been removed. This ensured the disappearance from the liver of any haemopoietic factor previously absorbed from the resected portions of the stomach and intestine. In agreement with earlier workers, Petri found that after total gastrectomy swine liver completely lost its anti-anaemic principle, but it was also found that resection of the fundus had the same effect. This somewhat startling result raises further problems as to the formation and absorption of the anti-anaemic factor. The fundus has no therapeutic effect in pernicious anaemia, but it must play an important part in the synthesis or absorption of anti-anaemic factor in other regions of the alimentary tract. This fits in with the fact that in patients with pernicious anaemia the fundus shows the most pronounced histological changes. It is perhaps foolish to speculate on the nature of the fundus action, but it is worth while mentioning preliminary experiments by Petri indicating that administration of nicotinic acid for a period of six months restored the anti-anaemic potency of the liver in a hog with the fundus resected but not in one on which a total gastrectomy had been performed. This favours Castle's view that the intestinal content of anti-anaemic factor is not the result of local synthesis but is due to absorption of pre-formed substance. There can be little doubt that if these results are confirmed and extended a new field of work is opened for physiologist and clinician.

Although the experimental production of pernicious anaemia still eludes us, some interesting information has been gathered on the pathogenesis of experimental endogenous pellagra. Three forms can now be described[10]: (1) the most severe, following total gastrectomy; (2) the most protracted, resulting from removal of pylorus and duodenum; and (3) a condition following removal of the distal two-thirds of the small intestine. The last variety resembles the second, but with the presence of a macrocytic hyperchromic anaemia, glossitis, and chronic diarrhoea. Clinically, indeed, the picture resembles that seen in sprue

[1] *Acta med. scand.*, 1934, **82**, 352.
[2] Ibid., 1941, **106**, 274.
[3] *Ann. intern. Med.*, 1933, **6**, 1535.
[4] Ibid., 1931, **4**, 1282.
[5] *Acta med. scand.*, 1935, **85**, 79.
[6] Ibid., 1941, **107**, 506.
[7] Ibid., p. 532.
[8] Ibid., 1936, **89**, 50; 1938, **95**, 415.
[9] *Acta med. scand.*, 1941, **109**, 59.
[10] Ibid., 1942, **111**, 75.

and in some cases of terminal ileitis. Experimentally it must be contrasted with the results following resection of the jejunum—namely, a mild degree of pellagra, hypochlorhydria, and, above all, a striking increase in red blood cells with a tendency to macrocytosis.[11] It is obvious that we are gradually accumulating facts as to the varied functions of the different regions of the alimentary tract, and more knowledge of its functional pathology may throw a sharp light on the pathogenesis of the anaemic states and deficiency diseases.

SUBACUTE BACTERIAL ENDOCARDITIS

A recent talk by Willius[12] is entitled "The Hapless Therapy of Subacute Bacterial Endocarditis." He points out that an occasional positive blood culture in a patient with a cardiac murmur and fever is not proof positive of subacute bacterial endocarditis. Without a doubt many instances of this type represent acute exacerbations of rheumatic endocarditis, in which from time to time streptococci in relatively small numbers are demonstrable in the blood stream. Such patients may recover without any treatment. But if the diagnosis of subacute bacterial endocarditis is confined to patients with pathognomonic signs such as embolic phenomena and splenomegaly the outlook is indeed grave, and there is little support for the new wave of optimism which is sweeping North America. Willius enumerates the systems of treatment that have had their day—immune transfusion, arsenicals, antiseptic dyes, vaccines, *x*-ray therapy over the cardiac region, artificial pyrexia, intravenous colloidal carbon, etc.—and he concludes that the present enthusiasm for chemotherapy, used alone or supported by anticoagulants or hyperthermia, should be met with scepticism. This cool outlook should be preserved in studying the recent paper by Smith, Sauls, and Stone.[13] They have summarized a number of group-studies by individuals who have treated series of cases, thus trying to avoid the fallacy of judging from isolated successes. The percentages of recoveries in these series certainly suggest a progressive improvement in results. The actual figures are as follows:

	Recovered	Died	Total
Non-specific treatment	6	628	634
Chemotherapy alone	12	186	198
Chemotherapy + heparin	5	38	43
Chemotherapy + hyperthermia ..	4	21	25
Chemotherapy + intravenous typhoid	4	17	21

Statistical analysis of these figures, which the authors unfortunately omitted to employ, shows that there is strong evidence that chemotherapy has improved the survival rate in subacute bacterial endocarditis. The data provide no evidence that heparin or hyperthermia significantly increases the survival rate above that for chemotherapy alone. There is a strong indication that intravenous typhoid vaccine does so, but one needs more cases in these last two groups. Smith and his colleagues stress the importance of early diagnosis, but we must remember Willius's hint that early diagnosis may be erroneous diagnosis. A second factor of importance is the maintenance of a high blood concentration of the drug. False hopes may be raised by the antipyretic action of sulphapyridine or by the failure of the blood cultures to show bacterial growth after the sulphonamides have been given, even though infection is still present. This error may be avoided by adding para-aminobenzoic acid to the culture medium to neutralize the bactericidal effect of the sulphonamide present in the blood when it is cultivated. Poston and Orgain[14] have found that there are very great variations in the reaction of different strains of *Str. viridans* to the sulphonamide drugs, and it is therefore desirable to test the strain with which the patient is infected against the available sulphonamides, in order to decide on the most suitable drug. There is a definite correlation between the effects *in vitro* and *in vivo*. If preliminary experiments of this kind are impossible, sulphapyridine is the drug of choice. Recovery from subacute bacterial endocarditis is in any event likely to be of limited duration and to be followed sooner or later by recurrence of infection or by cardiac failure. Using recovery in this restricted sense, chemotherapy has probably improved the chances of recovery in subacute bacterial endocarditis from about 1 in 100 to 1 in 20 or 30, and the ordinary clinician will do well to confine himself to chemotherapy with the sulphonamide drugs until there is more convincing evidence that results can be improved by the addition of anticoagulant therapy or artificial pyrexia.

INFECTIOUS MONONUCLEOSIS

In a recent monograph on the aetiology of glandular fever (or infectious mononucleosis) Wising[15] of Stockholm finds support for the assumption that a virus is the responsible agent and not *Listerella monocytogenes hominis* or a toxoplasm. Twenty-seven typical cases were studied. Cultures from blood and lymph nodes were negative. The injection of cultures of *Listerella* into rabbits and monkeys did not produce a disease picture similar to infectious mononucleosis in man. Attempts were made to transmit infectious mononucleosis in the acute phase to rabbits and monkeys; the results were negative in rabbits, but suspensions from lymph nodes produced typical mild infections in monkeys. Wising was surprisingly successful in obtaining human "volunteers" for his later experiments. (1) Four students received 20 intravenous injections of 100 million to 3,000 million *Listerella*, heated to 65° C. for two hours on two consecutive days. Their sera developed high agglutinin titres and positive flocculation reactions. The Paul-Bunnell test, which depends on the presence of sheep-erythrocyte agglutinins in amounts well above the normal, was negative. (2) Eight recently afebrile convalescents from mononucleosis and four healthy controls received intravenously 5,000 to 10,000 million heat-killed *Listerella* organisms in a single injection. Several persons developed malaise and chills, but the extent of the toxic response did not vary between the groups. (3) Five healthy medical students were transfused with heparinized blood or plasma from acute cases of infectious mononucleosis, and one developed an illness which was typical on clinical, serological, haematological, and histological grounds: the incubation period was 18 days, and symptoms decreased rapidly after the thirty-fifth day. Thus, in the experimental subject, further evidence was adduced that *Listerella monocytogenes* does not play a causal part in glandular fever. A virus may be the infecting agent, but unfortunately unfiltered and not filtered blood was used for the one successful experiment in transmission. Extirpated lymph nodes from sixteen cases were examined microscopically. No bacteria or protozoa were demonstrated, but photomicrographs revealed numerous large cells with a cytoplasm which absorbed ultraviolet light intensely. Further, the nucleoli were large and irregular and generally surrounded by irregular zones of chromatin. The author

[11] *Acta med. scand.*, 1942, **111**, 116.
[12] *Proc. Mayo Clin.*, 1942, **17**, 216.
[13] *J. Amer. med. Ass.*, 1942, **119**, 478.
[14] *Amer. J. med. Sci.*, 1942, **203**, 577.
[15] *Acta med. scand.*, 1942, Supplement, **133**.

states that these changes could be explained by the presence of a virus. Nettleship[16] inoculated chorio-allantoic membranes with filtrates of the blood and nasal washings of patients and produced small white pearly growths infiltrated with mononuclear cells. Van den Berghe and Liessens[17] also used bacteria-free filtrates, and consider the agent a virus. The agent having been isolated by tissue culture of bacteria-free filtrates, the authors were with it able to reproduce disease in monkeys, which developed a typical blood picture and heterophile reaction.

The laboratory and clinical data of 20 cases of infectious mononucleosis have been reviewed by Kilham and Steigman[18] of the American Red Cross-Harvard Field Hospital Unit. Four had clinical and three subclinical icterus; liver biopsy showed parenchymatous changes in one case. The Barrett[19] modification of the Paul-Bunnell test for the heterophile antibodies which agglutinate sheep erythrocytes was positive in all cases. (This modification differentiates the antibodies found in infectious mononucleosis from the types found in "normal" human serum and in human serum following horse-serum injection.) A high lymphocytosis was observed in all cases and an absolute or relative decrease in polymorphonuclear cells in many. No treatment proved effective. The agglutination of sheep erythrocytes in this disease is strongly reminiscent of the Hirst[20] test in influenza, in which the agglutination of chicken erythrocytes provides an easy and useful method of titrating influenza virus. The fact that exacerbations in the disease are usually unassociated with increase in the agglutination titre in the Paul-Bunnell test hardly supports the view that it has any immunological basis; may not the agglutination be due to persistent circulating virus? One is tempted to speculate whether the Paul-Bunnell test with sheep erythrocytes supports by analogy the view that infectious mononucleosis is of virus origin, and whether in other virus diseases the serum of the patient will be found to agglutinate the red cells of certain animal species.

FOOD PROBLEMS IN THE U.S.S.R.

A recent review of Soviet food problems[21] shows how the U.S.S.R. in some measure was able to prepare for the loss of much fruitful territory by shifting the basis of market grain from the Ukraine to the north and east. The Russians now rely on regions in Siberia in which preparations for rapid expansion had been well advanced in 1941. By September of that year the Altai area had three times its 1940 acreage under winter crops, and there was a similar increase in other districts. By means of irrigation schemes such an area as Uzbekistan has been able to turn over 1½ million acres into grain-producing land. The Altai area is growing mainly beet, the area given to this crop having increased from 60,000 to 100,000 acres between 1941 and 1942. Two refineries deal with 250,000 tons of beet a year. This immense development has been made possible by the use of some 150,000 motor tractors and 53,000 harvester combines, involving the training of many thousands of drivers and operatives. When, after the German retreat, territory in Western Russia was reoccupied, an intensive effort was made to get the land under cultivation; and, though the setback must have been great, prompt action and strict management in future will do much to minimize losses. About 500 tractors which had been buried by the farmers were recovered; collections of seed were instituted and credits granted for the purpose of buying seed and stock. By the end of March, 1942, collective farmers west of Moscow had stored 78.5% of the season's seed, and a number of fresh cattle ranches had been set up. Allotment holdings have been taken up eagerly, especially in Leningrad, where 22,000 acres round the city are under vegetables. Rationing began in July, 1941, first in Moscow and Leningrad and then in other industrial areas. The system has been one of differential rationing. For instance, the industrial worker gets 27 oz. of bread a day and the office worker 22 oz. Bread consumption as a whole remains higher than our own. Expectant and nursing mothers receive extra butter, sugar, milk, bread, and other cereals. During siege conditions in Leningrad meat, butter, and sugar became scarce luxuries, and were diverted to the armed Forces. In the interior of the country conditions approach normal, but the population behind the fighting fronts must be suffering serious privation.

[16] *Proc. Soc. exp. Biol.*, N.Y., 1942, **49**, 116.
[17] *C. r. Soc. Biol.*, Paris, 1939, **130**, 279; **131**, 156; **132**, 90.
[18] *Lancet*, 1942, **2**, 452.
[19] *J. Hyg.*, Camb., 1941, **41**, 330.
[20] *J. exp. Med.*, 1942, **75**, 49.
[21] *Wartime Nutrition Bulletin*, Nov.–Dec. 1942, No. 22.

SEE HOW THEY JUMP

Some readers may recall the irritation displayed by the versatile members of the "Brains Trust" on being asked how flies take off and land. The erudite zoological member of the team dismissed the question (*a*) as being unimportant, and (*b*) as being a matter of aerodynamics. The interesting *Monthly Science News*, *MSN*, issued by the British Council (3, Hanover Street, London, W.1) recently made good this deficiency on the part of the B.B.C. entertainers by recording an interesting experiment carried out some three years ago by Prof. Edgerton of Massachusetts. Prof. Edgerton put a bit of sugar on a piece of paper. To this was attached a few feet of string, which was also wrapped round the shaft of a high-speed camera. As the camera brought the film up to running speed, it wound the string attached to the paper and eventually dislodged the paper from beneath the fly which had settled on the piece of sugar. With this ingenious and simple experiment Prof. Edgerton was able to get accurate pictures of the fly taking off. This is how the fly did it. It first of all jumped backwards into the air for about an inch and at an angle of 60 degrees to the horizontal. Once it was clear of the ground its wings began to beat, and the fly came out of reverse and went forwards. The anatomy of the fly's legs makes it impossible for it to jump in any direction other than backwards. *MSN* suggests that, making use of Edgerton's observations, fly-swatters should be able to increase their score by aiming at the back area of a fly at rest.

MEDICAL ADVISORY COMMITTEE

The Minister of Health has set up a committee to advise him on the medical aspects of problems relating to the health of the people. The members of the committee are: the Presidents of the Royal College of Physicians, the Royal College of Surgeons, and the Royal College of Obstetricians and Gynaecologists; the Chairman of Council of the B.M.A.; Dr. G. C. Anderson; Dr. J. C. Arthur; Miss Alice Bloomfield, M.D.; Dr. J. A. Brown; Mr. E. Rock Carling; Dr. J. A. Charles; Prof. Henry Cohen; Dr. W. Allen Daley; Lord Dawson of Penn; Dr. E. A. Gregg; Lord Horder; Sir Wilson Jameson (vice-chairman); Dr. W. S. Macdonald; Dr. Alan Moncrieff; Prof. R. M. F. Picken; Prof. Harry Platt; Dr. A. T. Rogers; Dr. D. O. Twining; Dr. Oscar Williams; and Miss A. L. Winner, M.D.

War Medicine Series

The paper printed below is based on a lecture which was one of a series recently given at the British Postgraduate Medical School, Hammersmith

THE PRACTICAL MANAGEMENT OF WOUND SHOCK

BY

J. McMICHAEL, M.D., F.R.C.P.Ed.

Attempts to define "shock" are baulked in various ways. Newspapers and laymen use the word to describe any state of fright, with or without collapse, associated with injury or emotion. The older textbooks of surgery regarded it as a condition of "general depression of the vital functions" following on injury. This definition was recently put more crudely by a surgical colleague as "a state in which the patient is half dead." Since the last war the condition of low blood pressure observed in injured patients has been a subject of interest, and many definitions have limited shock to "a state of circulatory collapse following injury." This was the generally accepted definition when the present war began. Experience has revealed, however, that one important result of injury hitherto unappreciated may be renal failure, and the much-discussed "crush syndrome" has taken a prominent place as a remote consequence of injury. For various reasons it thus seems that the general term "shock" can no longer be limited to the circulatory effects of injury.

As no agreement on a classical definition of shock could be reached, there has been a great deal of confusion in the use of the term. It is this very confusion which has led to much ill-advised controversy on the value or otherwise of therapeutic measures. Some medical men, for example, have laid emphasis on the value of weak tea in treatment, as against blood transfusion. It is certainly true that, if all cases admitted to hospital after a raid are regarded as "more or less shocked," warm drinks may have a large measure of success. Those who restrict the term to cases showing low blood pressure find that a high proportion of cases do need transfusion. The only way out of this impasse seems to be the cessation of use of the word "shock" as an unqualified term.

Varieties of Shock

The following terminology may be used with advantage:

Fright, or emotional "shock" due to severe emotional strain.

Neurogenic Shock.—A state of low blood pressure with slow pulse, resembling an ordinary faint. This mild variety may be named "vasovagal syndrome." The onset is often early after an injury, and it is probably to this condition that some of the older writers referred when discussing "primary" shock. A more serious form occurs after severe cerebral injury, and may be called *cerebral shock*.

Oligaemic Shock.—A condition of circulatory collapse due to a low circulating blood volume. This condition includes the majority of cases of severe shock encountered as war casualties.

Post-traumatic Hypertension.—A cardiovascular reaction to injury recently described by Grant and Reeve (*British Medical Journal*, 1941, **2**, 294) which may simulate oligaemic shock.

Crush Syndrome.—This description is applied to renal failure which follows devitalization of limb muscles by crushing injuries. It is usually, but not always, preceded by a phase of oligaemic shock.

Toxaemic Shock.—This term may be applied to the circulatory collapse due to intense bacterial toxaemia, typically seen when a serous cavity is suddenly flooded with infected material—e.g., rupture of an inflamed appendix or a lung abscess. The blood volume in such cases may be normal.

Shock due to Defined Mechanical Causes.—For example, coronary thrombosis, massive pulmonary embolism, fat embolism, etc.

Dehydration Shock.—Occurring in diarrhoea (and ? diabetic coma).

It is apparent that by the use of such qualifying terms much of the present confusion would disappear. A common understanding of the condition under discussion might result in greater clarity when dealing with methods of treatment.

Clinical Manifestations of Shock

The various types may be discussed in order of increasing severity:

1. *Fright.*—When patients are admitted to hospital they may, on examination, look rather ghastly owing to a covering of dust, and cold extremities may give an initial impression of shock. On more detailed examination it is found that the blood pressure and pulse rate are within normal limits and that the injuries are of a minor nature. Such patients are simply suffering from fright and exposure. No treatment is required other than warmth, reassurance, and hot drinks.

2. *Post-traumatic Hypertension.*—A small proportion of patients with injuries of some severity may be found to have systolic blood pressures as high as 140 to 170 mm. Hg. The subsequent course of these cases shows that the normal pressure has been about 120 mm. Hg. As Grant has emphasized, there may be a rather thready radial pulse, which creates a false impression of circulatory collapse. Sphygmomanometer readings correct this impression. Although no active treatment is indicated at the hypertensive stage, the patients must be carefully watched, as they may pass on to a more characteristic picture of oligaemic shock. Our experience of this type of reaction has been limited to two cases, and in both the blood pressure fell to a low level, necessitating transfusion, within an hour or two of the finding of hypertension. The severity of the injury is usually in itself an indication for careful observation of these patients.

3. *Neurogenic Shock.*—In this condition there is a fall of blood pressure accompanied by a slow pulse. Two groups should be recognized:

(A) *Vasovagal Syndrome.*—This condition resembles an ordinary faint in every respect. Following on emotional stress or increased susceptibility to pain, the sensitivity of the carotid sinus mechanism seems to be altered in such a way that slowing of the heart and peripheral vasodilatation occur. The patients complain of a feeling of warmth, nausea followed by faintness, and a clammy sweat, while the systolic blood pressure falls to 50–70 mm. Hg and the pulse is slowed—e.g., to 50 a minute. It is important to remember, however, that these phenomena are compatible with considerable loss of blood from haemorrhage and that this vasovagal faint is a common consequence of venesection even if this is massive (Wallace and Sharpey-Schafer, *Lancet*, 1941, **2**, 393).

(B) *Cerebral Shock associated with Brain Injury.*—In a number of cases of severe head injury blood pressure may fall, the pulse may become slow or irregular, and various other vegetative disorders may be manifested—for example, deep, stertorous, irregular, or periodic breathing. The circulatory collapse in these cases is neurogenic in that it results from disturbance of the centres of cardiovascular control in the medulla.

Treatment of Neurogenic Shock.—In the uncomplicated vasovagal attack recovery usually follows rest in the recumbent position. In those cases which are associated with haemorrhage the blood pressure may remain low for an hour or more and the condition may pass into the more serious picture of oligaemic shock. For this reason continued observation is essential. In neurogenic collapse due to cerebral injury the condition is much more serious. Transfusion and the head-down position are both contraindicated, as they add to the risk of further intracranial bleeding. The surgical care of the head injury will dominate the picture: transfusion should

be employed only by agreement with the surgeon, when the risk of precipitating intracranial haemorrhage has passed.

Oligaemic Shock

In this variety a number of well-recognized features are present, the pathological basis of which may be described as follows. Owing to loss of circulating fluid the veins are poorly filled. With deficient venous return to the heart the cardiac output drops to a low level. This in turn leads to a fall in pressure in the aorta and carotid sinus. From these reflexogenic zones vasoconstriction and cardio-acceleration are initiated. The vasoconstriction takes place mainly in the skin and splanchnic areas, leading to skin and visceral pallor. Along with this there seems to occur general increased sympathetic activity with a tendency to sweat, giving the cold skin its characteristic clamminess. Up to a certain degree of blood loss the compensatory vasoconstriction may maintain blood pressure at a level which is near normal, but the pulse will be accelerated. With further blood loss compensation fails and the blood pressure drops, with further acceleration of the heart. When oligaemic shock persists over a certain time a great danger is the development of an irreversible state in which restoration of the circulating blood volume fails to produce lasting improvement. For this reason treatment should be early, adequate, and effective.

Some Quantitative Considerations.—The reduction of blood volume necessary to produce various degrees of shock has as yet been very inadequately studied. Keith, in the last war, found that the severest cases of shock had blood volumes down to 60% of normal—i.e., a fall from 5 litres to 3 litres in circulating blood volume. Observations made by the Army Transfusion Service and by workers in the British Postgraduate Medical School indicate that blood volumes may fall much lower than this. We have observed several cases with blood volumes of 1.2 to 1.5 litres and blood pressures about 50 to 60 mm. Hg; while at the other extreme a number of volunteers have given 1,200 c.cm. of blood without much decrease in blood pressure. Further quantitative studies on this important subject are required, but meantime we may work on the assumption that a reduction of blood volume by 1 litre may be well tolerated and that in the most severe cases (B.P. below 60 mm. Hg) we may perhaps be dealing with a blood loss of as much as 3 litres. The importance of such quantitative studies is that they reveal the necessity for large transfusions (over a litre) in the vast majority of cases requiring such treatment.

Pulse Rate.—Although it might be expected that the carotid sinus mechanism would dominate in the cardiovascular reaction to oligaemia, the pulse rate is often surprisingly slow. We have already mentioned the occurrence of vasovagal attacks with pulse rates below 50 after moderate haemorrhage (1 litre), and it should now be noted that pulse rates of over 120 are rare even in very severe shock. A common pulse rate with blood pressure below 80 is 100 to 110. Further, we have observed that transfusion, while increasing the blood volume and raising the blood pressure, may be accompanied by a further rise in pulse rate. This paradoxical pulse reaction emphasizes the unreliability of pulse-rate records as giving any indication of severity, progress, or results of treatment. Increasing and fundamental emphasis is therefore laid on blood-pressure records.

Causation of Oligaemia

During the last war, and in the scanty observations made by clinical workers up to the onset of the present war, there seemed to be considerable mystery about the loss of blood. It was thought that loss of blood was not accounted for by external haemorrhage, and there was much speculation about "pooling" of blood in various parts of the vascular system. We can now state that in the vast majority of cases the diminution of circulating blood volume is due to extravasation of blood either outside the body or into the injured areas. The evidence for this is as follows:

(A) A carefully taken history often reveals quite extensive bleeding from unexpected sources. For example, one patient, whose major injury appeared to be a comminuted compound fracture of both bones of the leg, volunteered the information that she bled so much from her scalp that the pillow was soaked and had to be changed in the ambulance. Careful examination both before and during the operation often reveals enormous effusions of blood among the lacerated tissues.

(B) When serum or plasma alone is used for transfusion the whole course of the condition is very similar to that of a patient who has had, for example, a large haematemesis. Immediately after any severe bleeding the haemoglobin is not much reduced, and the usual figure is 80 to 90%. It takes a few days for plasma volume to be made up and for full blood dilution to occur, and it is only after 48 hours or more that the haemoglobin figure really does give a true indication of the blood loss. In one patient who had considerable haemorrhage among the thigh muscles following a punctured wound, and who was given a serum transfusion, the haemoglobin settled down from 86 to 48% in the course of three days. There was no evidence here of any sudden reappearance of blood from a "site of pooling" as the patient recovered from his shock. It seems apparent from the final haemoglobin figure that he had lost about half his circulating blood volume by haemorrhage. This was further borne out by the fact that it took 1,800 c.cm. of serum to restore his blood pressure from 70 to 120 mm. Hg.

It seems, therefore, that haemorrhage plays a very considerable part—in our opinion the most important part—in the production of shock.

Shock due to Plasma Loss.—In our experience this is encountered only in shock due to burns and in patients who have been subjected to prolonged crushing injuries. Again the clinical manifestations are very obvious. There is extensive oedema of the injured areas, and the haemoglobin concentration rises as high as 160%. Along with this haemoconcentration the blood pressure falls, and when serum is transfused in a quantity adequate to reduce the haemoglobin to a normal level the blood pressure is once more restored.

Shock due to Blood Loss combined with Plasma Loss.—It is obvious that injuries causing blood loss may be combined with prolonged muscle-crushing, which seems to produce the factor of plasma loss as well. In one such patient who was fully studied the initial haemoglobin figure was 100%; serum transfusion reduced the haemoglobin to 72% with restoration of the blood pressure. One and a half hours later the haemoglobin rose to 90%, indicating loss of serum from the circulation, and this was accompanied by further circulatory collapse. After further transfusion, operation was undertaken on an injured limb, when a large pool of blood containing several pints was found under the deep fascia.

The observations at operation thus established haemorrhage as a factor, while the inability to retain transfused serum meant that the capillaries in some part of the body were leaking serum constituents.

Other Factors in Shock

While loss of circulating blood volume is the dominant single factor, we should not deny the possibility that other influences may render the syndrome much more complex. These should be kept in mind as follows:

(A) *The irreversible state* must first be considered. We have seen patients in whom the blood pressure has been low (below 90 mm. Hg) for a few hours, and in whom restoration of the blood volume by transfusion failed to produce anything more than a transient improvement. It may be that the prolonged tissue anoxia has led to grave changes in the central nervous system and in other organs. Whatever the explanation, this condition is responsible for many therapeutic failures, and it should be prevented by *early* restoration of the blood pressure.

(B) *Toxaemic Factors.*—In the classification outlined it was noted that severe bacterial toxaemia could in itself produce a shock-like picture. It is apparent that infection of traumatized tissues may lead to the same result.

(C) *Crush Syndrome.*—It is noteworthy that the fall in blood pressure associated with loss of half the plasma—i.e., about 1½ litres—may be much more profound than that which follows a similar blood loss. The demonstration of grave renal impairment at an early stage in such cases seems to indicate the release of toxic substances into the circulation: these may have damaging effects on organs and tissues other than the kidneys. Reduction of blood volume may possibly be poorly tolerated when haemoconcentration is present.

Treatment

Organization.—The shocked patient calls for more continued and assiduous attention than is required in any other condition. It should be realized from the outset that these injured patients are under the care of the receiving surgeon. In order to relieve pressure on the operating teams the services of physicians skilled in transfusion technique may be employed in supervising the work of resuscitation in special wards set aside for this purpose. It should be realized that adequate nursing aid should also be available; over a period of a few hours one nurse should be at hand for each patient requiring transfusion. There is usually little difficulty in achieving this through the help of volunteers from among the nursing staff. In addition to the ordinary pulse and temperature charts, blood-pressure records are very important. Students, nurses, and orderlies may be trained to record systolic pressure.

General Measures.—Patients should be undressed as quickly as possible so that a full assessment of injuries may be made. They should be put to bed in the recumbent position; if circulatory collapse is obviously severe the head-down position should be adopted while waiting to begin transfusion. Warmth is desirable, as these patients are often chilled; but overheating is to be avoided. In a striking recent paper Blalock and his colleagues showed that overheating was definitely harmful. Not only is blood deflected to the warm skin when it is badly needed elsewhere, but the metabolism of tissues in general is increased by warmth, calling for a still greater oxygen supply. Adequate cover should therefore be given to shocked patients, but there is no need to worry unduly about cool or cold extremities.

Morphine.—Morphine should be given when indicated. It has little value as a specific therapeutic measure, but if there is a complaint of pain it should not be withheld. It is usually found, however, that patients in profound oligaemic shock do not complain of pain, though restoration of the blood pressure by transfusion is accompanied by increasing restlessness and awareness of pain. Morphine is therefore likely to be required while the patients are recovering rather than during the stage of severe shock.

Fluid Administration.—Since loss of circulating fluid is a fundamental feature of oligaemic shock, fluid replacement is necessary. If the patients are thirsty they should be allowed glucose drinks, warm tea, or water as desired. Vomiting is sometimes a troublesome feature, and in such cases tap-water may be given slowly per rectum. If these methods prove unsuccessful, deep intramuscular infusions of saline may be given into the lateral aspects of the thighs, the needles being pushed right down to the bone. A large amount of fluid may be administered in this manner.

Transfusion.—Blood transfusion is the sheet-anchor of successful treatment in oligaemic shock. Other transfusion fluids may also be used, and these are discussed below. Considerable clinical judgment is necessary to decide when transfusion should be begun, and no simple rule can be enunciated. It is obvious that in patients with very low blood pressures—e.g., below 80 mm. Hg—transfusion should be started at the earliest possible moment. Where injuries are severe, and from the history and from examination there is evidence of severe blood loss, transfusion should be begun without delay, even though the blood pressure may not be below 100 mm. Hg. Experience has shown that in such cases more serious vascular collapse may develop quite rapidly. In the less severe cases of injury a period of observation is necessary. A low blood pressure, if associated with a slow pulse, is likely to recover spontaneously: in other instances the pulse may become more rapid and the patient will pass into a state of obviously severe oligaemic shock, for which transfusion is required. Generally speaking, if the blood pressure remains at or below 90 mm. Hg for more than one hour transfusion should no longer be delayed. The danger of prolonged lowering of blood pressure is the development of the irreversible state already mentioned.

The volume of blood or blood substitute to be given by transfusion is determined entirely by the response of the blood pressure. The transfusion should not be stopped until the blood pressure has returned to a normal figure, say 110 to 120 mm. Hg. In previously hypertensive subjects it will be found that the blood pressure will go on rising towards a higher figure with quite moderate transfusion volumes, and in such patients the transfusion should be continued until a pressure of 140 to 150 mm. Hg is reached. When a normal blood-pressure figure has been reached the transfusion apparatus should not be at once disconnected but the infusion should be allowed to continue slowly as a drip: the slow drip is a precaution against a further fall in blood pressure which may result from loss of the saline part of the transfusion fluid or which may develop at subsequent operation. Arrangements should be made for the continuation of transfusion while any operative procedures are being undertaken.

Transfusion Fluids.—Blood is the fluid of choice, but there are considerable advantages in the use of serum or plasma. The latter fluids can be used without cross-grouping, and we have seen no untoward results from the administration of quantities as great as 2 litres. During the administration of serum the recipient's haemoglobin is diluted and he is rendered moderately anaemic. It is desirable, therefore, that some limit should be set to the degree of blood dilution produced by such methods of transfusion, and we regard it as unwise to reduce the haemoglobin below 60%. It is safe to give serum or plasma in quantities up to 1 litre, but if further transfusion is necessary blood should be used where possible.

Other blood substitutes include Bayliss's gum-saline, introduced in the last war. Casualties have not yet occurred on such a scale as to exhaust our stocks of blood and serum, but in such an event gum-saline would undoubtedly be used. More recent blood substitutes devised in America include solutions of pectin and isinglass. We understand that these are rather disappointing.

Reports of Societies

BACILLARY DYSENTERY IN THE MIDDLE EAST

MODERN CHEMOTHERAPEUTIC TREATMENT

At a meeting of the Royal Society of Tropical Medicine and Hygiene on Nov. 4, with Sir RICKARD CHRISTOPHERS, F.R.S., presiding, Col. N. HAMILTON FAIRLEY, F.R.S., presented on behalf of himself and Col. J. S. K. BOYD the results of certain work carried out in the Middle East on the diagnosis and treatment of bacillary dysentery, with special reference to sulphaguanidine. Col. Fairley said that the joint investigation of Col. Boyd and himself ended in January, 1942. The analysis of data was at that time incomplete, and further data might be incorporated before the paper was published.

The outstanding feature of bacillary dysentery in the Middle East, said Col. Fairley, had been its mildness. Even with Shiga dysentery the mortality had not been as high as was expected. But although the general mortality rate had been exceedingly low and the incidence much less than in the last war, bacillary dysentery continued to cause great wastage of man-power, especially as duration in hospital averaged three to four weeks.

Army Prophylaxis

At Headquarters, Middle East, the aspects on which the work had been concentrated were Army sanitation, fly control, the dysentery carrier, bacteriological types of organisms present, and specific treatment. In the Middle East fly transmission was the rule, and faecal-feeding flies abounded. In the forward areas it was the duty of the sanitary personnel to burn or treat promptly with insecticide all exposed excreta and animal carcases. Where possible in these forward areas trench latrines were immediately dug and provided with well-fitting fly-proof covers if available. Failing this, earth was immediately used to cover the stools in trench latrines, which were sprinkled once daily with powdered borax or some insecticide. It had been found that desert flies did not like entering roofed structures where it was darker inside than out. In camps curtains of fishing-net hung outside of doors and windows afforded protection even although flies could get through the meshes. Cooks and all people handling food were instructed to wash their hands regularly. Native labour presented a problem, but when latrines of the Moslem type were constructed, fly-proofed, and conveniently placed this problem became manageable.

Shiga dysentery on the average accounted for about 10% of all cases seen in the Middle East. The most common organism was Flexner II, and the next most common was Flexner VI, the old Newcastle–Manchester group. About 10% of all dysentery was amoebic (with which the present study was not concerned); no bilharzia dysentery had been seen by Col. Fairley. After dealing with the different types of exudate and the relation between these and the percentage of isolations, he passed on to the carrier problem. In chronic cases, and also in acute cases which failed to clear up in the ordinary way, sigmoidoscopic examinations were always made, and he described the appearances and varieties of ulceration seen in such examinations and discussed their significance. In certain cases of chronic Shiga dysentery ulcers surrounded by normal-looking mucous membrane were found to contain Shiga bacilli six months after the original attack.

Clinical Aspects

Most epidemic diarrhoea was dysentery. From a military point of view any person who had colicky pain followed by febrile diarrhoea with fluid stools containing flakes of mucus or mucus and blood should be regarded at once as a case of dysentery and sent away without delay. He had stressed the mild nature of most of the dysentery encountered, but with Shiga dysentery there were many exceptions. Fulminating cases were rare. He recalled one case, however, in which death occurred within 32 hours of onset. In the ordinary severe Shiga infections onset might be sudden or insidious. The former began with a rigor associated with fever, nausea, and vomiting; in the latter, severe intestinal symptoms might not develop for several days. One unfortunate feature about bacillary dysentery was that neither the mode of onset nor the febrile course necessarily afforded a reliable index to prognosis.

Complications were rare, but some were met with which had not previously been described. Local complications included perforation, intestinal haemorrhage, chronic peritonitis with effusion and pneumoperitoneum (one case); among the systemic complications were peripheral circulatory failure, renal failure, and arthritis.

The majority of cases of non-Shiga dysentery ultimately got well, in Col. Fairley's experience, with rest, copious fluids, appropriate dietary, and magnesium sulphate, but magnesium sulphate treatment should not be continued over too long a period, as it sometimes tended to keep up the diarrhoea. With regard to dietary it had been found that with milder infections milk drinks could be allowed at a relatively early stage without disadvantage.

The conclusion reached with regard to serum treatment was disappointing. He took out with him to the Middle East a specially prepared experimental batch of high-titre anti-dysenteric Shiga serum (1 c.cm.=20,000 I.U.), and had a fair opportunity of testing its value. It certainly relieved toxic features—presumably by neutralizing circulating Shiga toxin—but its benefit was rarely more than temporary.

Experience with Sulphaguanidine

He well remembered three of the first cases treated. Two of them had been under observation for three months and no treatment had made any real difference to the ulcers. Within 14 days of beginning sulphaguanidine treatment the ulcers completely healed, and the symptoms, which at this stage were mild, entirely disappeared. In the third case, which had lasted for about six months, there was again complete healing of the ulcers within a fortnight. A much wider investigation with the drug was then undertaken, and it was applied in a series of over 500 cases. Care was taken to combat dehydration where present.

The administration of sulphaguanidine was followed in some cases by headache or nausea, and in a few instances toxic rashes and fever developed. There was not a single case of haematuria, agranulocytosis, haemolytic anaemia, or jaundice, nor did sulphaguanidine bring about obstructive effects in the kidney. In 135 proved Shiga cases which recovered under sulphaguanidine therapy there was as a rule quite early an astonishing improvement, manifested by an increased feeling of well-being, rapid relief of abdominal pain and tenesmus, and a decrease in abdominal symptoms. An early reduction of temperature and pulse rate took place in uncomplicated cases, which reached normal in one to three days. There was also a remarkable reduction in the daily number of stools, and a rapid disappearance of blood and subsequently of mucus from the faeces.

In a total of 84 cases in which Shiga bacilli were isolated Col. Fairley was able to show the results in the following tabular form:

Interval of Days between Onset and Beginning of Treatment	No. of Cases	Average Number of Stools in 24 Hours preceding Treatment	Average Time in Days after Treatment started before Stools per Day were—		
			3–5	2 or less	Formed
1–5	39	27·8	4·0	5·3	7·7
6–10	32	21·7	4·0	5·4	7·15
11–20	13	14·1	3·0	5·0	8·3

That result could be interpreted only by assuming that there was an active bacteriostatic action on the dysentery organisms in the bowel wall. Out of 12 more chronic cases, 9 were completely cured as shown by the sigmoidoscope; in 2 others a certain amount of diarrhoea persisted, and there was evidence of sluggish healing, although there were no ulcers; in the twelfth case the symptoms persisted, but there was no real opportunity of following up this case, which must be put down as a failure. In the entire series of over 500 cases there were 5 deaths; in two of these the patients were really moribund before sulphaguanidine was given and died within 24 hours. The third case received a full course of treatment, but the patient died of cerebral thrombosis during convalescence, and at necropsy the colon was found to be completely healed. The fourth patient had an advanced chronic bilateral hydronephrosis, while the fifth died of lobar pneumonia, which was either present at the time or developed shortly after treatment.

If supplies were sufficient, the therapeutic ideal from the Army point of view (Col. Fairley concluded) was that every dysentery patient should have sulphaguanidine at the earliest possible moment. The case should be diagnosed on clinical grounds, and, although specimens should be sent to the laboratory for culture and microscopical reports, the clinician should not await the return before beginning treatment. Such treatment would be a means of saving life in a number of Shiga cases; it would shorten the stay in hospital of the average dysentery case; and would largely eliminate carriers. Sulphaguanidine, good as it was, might not be the ideal drug for dysentery; it was expensive and had to be given in large dosage. Two other drugs were now under trial—sulphasuxidine and sulphamethazine—and it was possible that these or analogous compounds in the future might be even more useful. Both Col. Boyd and he felt convinced that in drugs of this type there was available for the first time a specific agent for the cure of bacillary dysentery; since dehydration occurred in this disease it was essential that such drugs should not produce renal blockage.

Discussion

Dr. R. CRUICKSHANK said that for the laboratory diagnosis of bacillary dysentery a medium had now been found which was a great advance on McConkey's. This was desoxycholate acetate, and with this it had been found, as Col. Fairley's work had shown, that the convalescent carrier was much more common than had been originally supposed. As for the new drugs in treatment, sulphaguanidine was less effective with the Sonne infection than with Shiga. He had had an opportunity of trying sulphasuxidine and had found it more effective than sulphaguanidine in dysentery of the Sonne type.

Dr. H. J. SMYLY, who had lately returned from Occupied China, said that in December, 1941, he received out there 5,000 half-gramme tablets of sulphaguanidine for clinical trial, and when summer dysentery set in he arranged to carry out a systematic investigation with the drug. The average mild cases which came in on the third or fourth day and cleared up after a few days with rest and simple treatment were excluded. The cases selected were those of young children under 10, cases of less than 24 hours' illness, severe cases with more than 20 stools a day, and chronic cases of over one month's duration. The doses given were initially one-tenth gramme per kilo body weight, and then half of this every four hours day and night until the stools were fewer than five a day. All the acute cases improved rapidly, the early cases usually within the first few hours, and these were apparently well within three or four days. But one chronic case—a man aged 30 who had had dysentery for two years—showed no improvement whatever, although he had had sulphaguanidine for the exceptionally long period of 16 days.

Sir PHILIP MANSON-BAHR said that he had used sulphaguanidine for over two years in a good many cases of chronic bacillary dysentery and also of colitis. He was a bold man who would say that he had a cure for ulcerative colitis, which of all cryptic diseases was most cryptic, but he conceived the idea of injecting sulphaguanidine per rectum—it was very well retained—and, watching the cases by means of the sigmoidoscope, he had become rather confident about some of the results. In some cases of chronic bacillary dysentery the results were dramatic.

In the course of the further discussion Lieut.-Col. BOLAND, R.A.M.C., recently returned from the Middle East, expressed a more cautious view. His experience of one year out there without sulphaguanidine and one and a half years with it had left him with an open mind. He still thought there had not been a sufficient number of controlled cases to permit an estimate of the exact effect. Supplies of the drug also had been rather limited. Cases of dysentery in the Middle East were comparatively mild, and the mortality was low. There should be a large-scale experiment in which considerable numbers of cases were treated with the drug while others served as controls.

Correspondence

Physical Treatment of Acute War Neurosis

SIR,—Dr. Sargant's (*Journal*, Nov. 14, p. 574) emphasis on the practical value of physical as against psychotherapeutic measures and environmental readjustments, in relation to their greater facility of use and rapidity of action, is especially applicable to an army in the field or under conditions prevailing in an expeditionary force.

Practical experience of the psychiatric casualties occurring in the M.E.F. during the last two years has borne out very strikingly the great importance of early and adequate physical treatment in the acute war neurosis. In the great majority of cases of acute war neurosis rapid decisions have to be reached upon three questions—whether the case requires evacuation from a forward area; whether treatment is likely to prove beneficial in a reasonable time at an ordinary base hospital; or whether, in view of the exigencies of the situation and the pressure on accommodation, a more complete evacuation is necessary. The necessity for reaching a final decision on these points makes physical measures of treatment a matter not so much of choice as of necessity.

The comparison between the "acute abdomen" and the "acute neurosis" in its relation to the urgency of treatment necessary, and in the effects of delay in instituting such treatment upon the ultimate prognosis, was shown sufficiently strikingly throughout the whole period under review. The patient who was treated within a few hours generally showed a correspondingly good prognosis, whilst the longer the delay in commencing treatment the more unfavourable the prognosis became from the point of view of return to full duties, especially in a forward area. Unfortunately, although the importance and significance of these factors were well recognized in theory, the problem of carrying them into practice under the conditions of warfare actually prevailing presented great and, at times, apparently insurmountable difficulties.

The most striking features of desert warfare in relation to psychiatric casualties were: (1) the extreme fluidity and mobility of such warfare, at least during the actual campaign; (2) the long and arduous lines of evacuation; (3) the extreme physical strain and mental stress involved during this evacuation.

The responsibility of providing the immediate treatment for the battle neurotic lay, and lies, with the regimental medical officer in a forward area; and, as a corollary, the necessity for ensuring that such medical officers have an adequate knowledge of the principles of early treatment and, equally important, an adequate supply of drugs to carry such principles into effect, becomes a matter of very great importance. The ideal choice of drugs for the medical officer in a forward area is, of course, debatable, and cannot be discussed here. In any choice of drug the essential features would appear to be standardization, low toxicity, small bulk, and simplicity of administration.

In practice, two main groups of cases were met with in a base psychiatric centre: (1) The more usual group, in which the neurosis had been developing during a lengthy evacuation lasting several days, and in which treatment had either been intermittent or, as in some cases, not given at all. (2) The group where the acute neurotic was admitted within a few hours—following, for example, severe air raids, or with naval cases. In the latter cases treatment was carried out on the general lines described by Dr. Sargant—usually by a combination of luminal and paraldehyde. In the former the methods of prolonged narcosis were more frequently employed. In both groups the necessity for distinguishing between the true battle neurotic as such and the "exhaustion state" was important, the latter responding rapidly to simple sedation and the more routine measures of physical treatment—a warm bath, a hot drink, a comfortable bed, and general care and attention.

Several practical difficulties occurred in the actual administration of physical measures of treatment; for example, in prolonged narcosis several cases of collapse and hyperpyrexia of an alarming type occurred, even with relatively small dosages and with skilled nursing care and attention. The danger of prolonged narcosis—sufficiently real, as Dr. Sargant points out, in the ordinary course of events—becomes considerably intensified under tropical or subtropical conditions. On several occasions fairly intense aerial bombardment occurred in close vicinity to psychiatric centres; the value of physical as against purely psychotherapeutic measures became especially apparent at such times.

The importance of the patient's original personality and constitution is, as Dr. Sargant states, of very great significance, and was very strikingly emphasized in a series of 350 cases of acute war neurosis analysed at the psychiatric centre which I commanded. The effect of an unfavourable constitution under varying degrees of battle stress was brought out statistically in quite a dramatic manner. The use of intravenous barbiturates in the removal of the conversion symptoms of the hysterical reaction was found of very great value, and here, also, it was found the earlier the treatment was carried out the more satisfactory the prognosis became.

Convulsive therapy was used to an increasing extent, both in the depressive states described by Dr. Sargant and in certain hysterical cases; the results were most encouraging, and the risks of fracture regarded as negligible—no complications arose in any case in our series.

In conclusion, I could summarize our experience in the M.E.F. as follows: (1) It has emphasized the vital importance of physical measures of treatment. (2) The physical measures of treatment advocated in Dr. Sargant's paper have proved of the greatest value in the treatment of battle neurotics. (3) Early and adequate treatment is of paramount importance. (4) Certain practical difficulties exist in the administration of physical methods of treatment in a theatre of war.—I am, etc.,

H. B. CRAIGIE.
Major, R.A.M.C.

London, S.W.7.

Haemolysis in Causation of Erythroblastosis Foetalis

SIR,—I have read with great interest the paper by Messrs. K. E. Boorman and B. E. Dodd and Dr. P. L. Mollison on the clinical significance of the Rh factor (Nov. 7 and 14, pp. 535, 569), particularly that part which deals with erythroblastosis foetalis. The Boston school (Blackfan and his colleagues) has maintained that erythroblastosis foetalis is a primary condition and the cause of icterus gravis, hydrops foetalis, and congenital haemolytic anaemia, whereas my colleagues and I have held the view that it is the result of haemolysis, and therefore a symptom and not the cause of these syndromes. When I last saw the late Dr. Blackfan in 1937 I discovered that our arguments had somewhat shaken his views; since that time, chiefly as the result of the work of my colleague, Dr. H. S. Baar, on the metabolism of haemoglobin (shortly to be published in the *Archives of Disease in Childhood*), we have obtained other data which support the theory that haemolysis is the underlying factor in the disease.

When I realized that Levine and his colleagues had produced evidence that iso-immunization was the cause of erythroblastosis foetalis, I endeavoured to obtain some anti-Rh sera to test their conclusion. I was unsuccessful in my attempts, but I am glad that the writers of the paper were more fortunate. Paediatricians in general and my co-workers in particular are greatly indebted to them for their work on this subject. They have produced evidence which strikingly supports our thesis,

but, even more important, have devised a method for determining whether subsequent children are likely to be affected by erythroblastosis foetalis or not, and made a real contribution to the treatment of the disease. There still, however, remains unsolved the greatest problem in treatment—namely, the prevention of those ghastly sequelae, spastic diplegia, cirrhosis of the liver, and bone changes, which so frequently occur in this disease, and which often make the paediatrician regret that he has saved the child's life.

Since the thesis that erythroblastosis foetalis is the result and not the cause of this disease may now be accepted, would it not be better and more accurate to adopt the terminology suggested by Hawksley, Gittins, and myself (*Arch. Dis. Childh.*, 1933, **8**, 159) and speak of the condition as haemolytic anaemia of the newborn and subdivide it into three clinical forms: (*a*) with hydrops foetalis, (*b*) with icterus gravis, (*c*) without oedema or icterus?—I am, etc.,

Birmingham. LEONARD G. PARSONS.

Bacteriophage Treatment of Bacillary Dysentery

SIR,—Surg. Cmdr. D. C. Wilson (July 18, p. 81) makes certain remarks on my article (June 13, p. 719) which I trust I may be allowed to reply to.

He makes the point that my figures deal only with death rates (which, of course, was all I set out to deal with) and not with duration of illness; and on the strength of this he states that the aim of all three Services is "to return a fit patient to duty at the earliest possible moment." Many Alexandrian onlookers, who sometimes see more of the game than the players, will be astonished at this gratuitous statement. Actually my theme has always been that there is no need for other than a minimum of Service dysenteries ever reaching hospital. This latter occurs usually when they have passed to the stage named by me "neglected dysentery" (*B.M.J.*, 1941, **2**, 280), with resulting greater incapacity and need for longer sick and convalescent leave than if their dysenteries had never been allowed to develop into full-blown attacks. *Preventive development* of dysentery from pre-dysentery phases, like "Gyppy tummy," could—I feel every confidence in asserting from civil experience—be easily achieved by making available adequate supplies of good phage preparations at all advanced Navy, Army, and Air Force units, for administration on the first appearance of intestinal upsets of a pre-dysentery character. Has Cmdr. Wilson not, in his own words, confirmed that "civilians in Alexandria are so 'phage-minded' that to my knowledge they treat themselves with bacteriophage on the slightest suspicion of 'Gyppy tummy'"? Therefore, I think I am in a position to set his mind at ease regarding duration of illness, feeling sure that the adoption of a sound phage policy, such as outlined, could effect more in the way of improving this aspect of the situation than whatever measures may hitherto have been at work.

Cmdr. Wilson refers to a trial, in which he took part, of phage therapy in a small number of dysentery cases in an Alexandria Service hospital, from which he concludes that there was not enough "variation in hospital time" between the phage-treated and the control groups "to justify the continuation of the bacteriophage treatment." The inference here is, of course, that phage did not live up to what was expected of it, and proved no better than "the then standard treatment of sodium sulphate and fluids." The inference is misleading in that the experiment, in my estimation, was doomed to failure from the start; and the description given of it deals with no more than the opening act—"curtain raiser" might be a juster term—since, Cmdr. Wilson will recall, the performance was stopped by superior military orders before it had got properly under way. This helps to explain the challenge of my *B.M.J.* letter (1941, loc. cit.), which challenge still remains open.

Finally, Cmdr. Wilson reports that by the introduction of sulphaguanidine in the spring of 1941 a reduction in the duration of illness to 11 days from the onset was achieved, which result "appeared to make the further trial of bacteriophage superfluous." I hope Cmdr. Wilson will forgive my disillusioning him, but the facts are that statistical analysis of the recent authoritative Army figures of Cols. N. Hamilton Fairley and J. S. K. Boyd (*Lancet*, 1942, **1**, 20) and of my own figures of 13 years ago (*Lancet*, 1929, **2**, 273) reveals that sulphaguanidine presents no advantage whatsoever over phage in its rate of cure of the acute disease. Moreover, can the sulphonamides be administered with impunity to provide "preventive development" of full-blown dysentery in the same way that phage can? If so, why then, as to-day's "favourite," are they not made available at once and used (which in vain I have advocated should be done with phage) where they are most needed—the front line of all three fighting Services?—I am, etc.,

ARTHUR COMPTON,
Director of Laboratory Service, Alexandria Municipality.

First-aid for Fractured Spine

SIR,—It is with deep regret that I read of the tendency to instruct first-aiders to carry cases of fractured spine in the supine position. There is, of course, no doubt that, if carefully handled, a fractured spine can be transported safely in this position, but it entails expert handling on every occasion by skilled first-aiders. The question arises, Is this expert attention always present, and, if so, are there always the time and the facilities (e.g., during air raids) to ensure that the natural contour of the spine is rigidly maintained and that no flexion movements of any kind take place? My own experience tells me that often there is no time for attention to small details of this sort and that consequently irreparable damage may be done by injudicious handling. Should not, therefore, the first-aider be instructed to carry the patient in that position where harm is less likely to result—namely, the prone position? The whole value of this method lies in the fact that the dangerous movement of flexion is guarded against during transport. This danger is always present, and its liability to occur can well be appreciated when one considers all the movements often necessary to remove a patient from a demolished or partly demolished building on to the stretcher outside. It is these manipulations that may have such serious consequences should transport be carried out in any position other than the prone.

As regards the difficulty in diagnosis, the main duty of the first-aider is to treat the most important condition arising out of the accident. He is not concerned with accurate diagnosis. In the case in question, the patient will readily inform the first-aider as to the site of his pain, and should this be anywhere along the vertebral column no further investigation should be necessary; the patient should immediately be turned into the prone position. Quite apart from the advantages detailed above, considerable relief from pain and much comfort are attained by this change of posture.

To all rules there are, of course, exceptions, and in this case one might argue that patients with fracture of the cervical spine are better carried on their backs. This is quite true, but there is still little difficulty for the first-aider as regards diagnosis because these cases fall into two simple groups: first the fracture-dislocation, where the patient is usually unconscious and beyond treatment; and, secondly, the subluxation, where the main complaint is pain in the neck and limitation of movement. In the latter case the first-aider should have no difficulty in instructing the patient to lie flat on his back with a small pillow in the nape of his neck.—I am, etc.,

DESMOND K. MULVANY,
Hospital of St. John and St. Elizabeth. Surgeon, E.M.S.

SIR,—The prone position in the emergency treatment of fractured spine has always given me the impression of being of more theoretical than practical value, and I was interested to read about Lieut.-Col. J. L. Moir's method of transport in the supine posture (Oct. 31, p. 529), which appears to be of definite advantage to the first-aid worker.

The supine position is, I think, the method of choice not only because it is simpler from the first-aider's point of view but it is much safer and more comfortable for the patient. The diagnosis at the time of injury or in the casualty department of a hospital is often difficult and therefore often incorrect. Fractured pelvis, with or without abdominal complications, and fractured ribs are frequently the cause of error, and in such cases the prone position can only be harmful. Fractures of the spine may be complicated by head injuries, fractured limbs, and visceral injuries; transport of these patients in the prone position is contraindicated. At a recent large-

scale Home Guard exercise I attended, many "fractures of the spine" were admitted in the prone position, which was difficult to maintain even in these uninjured "patients." Others treated in the supine posture were much more comfortable.

I consider it to be an advantage if the patient on arrival in hospital is fixed on a special frame such as the one I described (*Journal*, March 4, 1939, p. 444), which holds the spine in a moderate degree of extension and yet allows nursing and transport without disturbing the fracture. The principle is similar to that of the Thomas splint in the first-aid treatment of fractures of the femur. Unless some form of splintage is adopted the patient is moved bodily on several occasions from one site to another without adequate fixation of the spine; four transferences are needed for *x*-ray purposes alone.

Watson-Jones first advocated the prone position in the emergency treatment of fractured spine in 1931, and it has been widely adopted since. I feel that after this extended trial the time has come to assess its practical significance in first-aid work.—I am, etc.,

Pinderfields Emergency Hospital. GEOFFREY HYMAN.

SIR,—As a "mere" physician whose waning energies wartime conditions have directed to the task of teaching first aid to Home Guard and A.R.P. personnel, I was interested to read the letter of Mr. Thomas Stowell on first aid for fractured spine in the *Journal* of Nov. 21. I think many will regret that he did not ask for space for details of his methods. I hope he will also give us the benefit of his experience in teaching first-aiders how to diagnose the presence of fracture. It is very difficult to teach diagnosis of any injury; that of spinal injury is the most difficult of all. I am sure that Mr. Stowell does not intend to imply that first-aiders ought to diagnose fractures which "in the absence of repeated *x*-ray examinations are overlooked until later disabilities arise."—I am, etc.,

Downton, Wilts. J. C. MATTHEWS, M.D., F.R.C.P.

Sulphonamides for Gonorrhoea

SIR,—Dr. M. R. Soni (Nov. 21, p. 617) says that a few years ago I "stated that it is better to wait until the attack [of gonorrhoea] has lasted three weeks before starting treatment with any of the remedies [i.e., sulphonamides]." It is not strictly correct to say that I "stated, etc." In my letter to which Dr. Soni refers (*Journal*, 1938, **2**, 91), I said, "On the strength of this evidence, I suggest that, etc.," and the conclusion of the same paragraph indicated, I hoped, that the recommendation was rather tentative and put forward as a basis for discussion. I still believe that the suggestion was sound as *applied to any sulphonamide remedy which had been tested at all extensively then*, but very soon afterwards it became clear that sulphapyridine was so far superior to sulphanilamide and uleron that no wait was necessary. As I had felt that the suggestion or recommendation was tentative, no public recantation seemed necessary. I hope to profit by this error of omission in future.

Dr. Soni challenges my statement that there is good evidence that administration of 5 g. sulphathiazole on two successive days eradicates gonorrhoea, in males at least, in over 90% of cases, and to prevent any misunderstanding I should like here to cite briefly the evidence which I had in mind: I had already circularized it to directors of V.D. clinics in England.

Prof. G. Miescher, Zurich (1940), as a result of a systematic trial of nine schemes of dosage, arrived first at a one-dose cure and later (1941), in collaboration with Schnetz in a paper which disclosed very careful study of the cases, recommended 5 doses of 1 g. each at intervals of two hours on each of two successive days. With this scheme they claimed 55 cures in 56 cases. Miescher's work was evidently taken seriously by some German Army medical officers. B. Mörschhäuser (1942) reported that with 10 tablets on each of two successive days the relapse rate in 731 cases had been 5.4%. W. Heyn (1942), in 250 cases treated with 10 tablets the first day and 8 the next, had 10% of relapses. Taggeselle (1942) reported 12% relapses in 110 cases treated with 9 tablets a day for 2 days.

Since dispatch of the letter criticized by Dr. Soni I have found three other references which testify to the powerful effect of sulphathiazole in sufficient dosage. H. Haxthausen, Denmark (1941), reporting on 310 cases of complicated and uncomplicated gonorrhoea, said that in the uncomplicated ones 6 g. daily for two days had yielded 87% of cures in males and 93% in females. J. P. Pappas, U.S.A. (1942), claimed cures in 23 of 28 cases of previously untreated acute gonorrhoea in soldiers treated each with a single dose ranging from 5 to 7 g. H. Pfisterer (1941) reported 95 cures in 100 cases treated by Miescher's two-day method.

The cases in the reports quoted above appear to have been under close control, and this probably eliminated one source of error in many civilian observations—the patients' failure to take the prescribed doses.—I am, etc.,

London, S.W.1. L. W. HARRISON.

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Reporting of Deaths to Coroner

SIR,—In the *Supplement* of Sept. 12 (p. 25) there appeared a most interesting opinion as to the reporting of deaths to the coroner. I am not concerned with the circumstances that led to that opinion being sought or given, but I venture to submit that, without careful appreciation of the words used, the opinion may be misunderstood.

The preamble that leads to the opinion states that the coroner *asked* for certain cases to be reported to him; the opinion deals with the matter in terms of the coroner having or not having a lawful right to require the information. The answer given does not exactly correspond with the question that appears to have been asked, and it is in that aspect of the matter that confusion of thought may arise.

It is fundamental to a coroner's jurisdiction that he be informed of a death: before being informed he has no powers. As the opinion points out, apart from a few statutory examples (deaths in mental institutions, foster children, etc.), there is no statutory duty imposed on any person to report deaths to the coroner. By common law, however, there is a duty on any person who knows that a death should be investigated by the coroner to report the fact of that death to the coroner or to the police. And in this connexion it should be remembered that a medical man, with his scientific knowledge and his keener appreciation of the facts, is in a better position to exercise this common-law duty than the average layman.

Under the law relating to the registration of deaths a doctor is required to give a medical certificate as to the cause of death to the best of his knowledge and belief; it is said that he should give a certificate even though the death be violent, since there is no legal sanction that makes any provision absolving him from the duty that statute law has cast upon him. Strict adherence to legal procedure, then, would require that the practitioner on the death of a patient whom he has attended during his last illness should issue a certificate of the cause of death (if he knows it) and at the same time report the case to the coroner if it is one which should be reported. If he does not know the cause of death he cannot issue a certificate, for the wording of Section 3 of the Coroners Act of 1887 casts upon the coroner the duty to inquire into all deaths the cause of which is unknown. If the doctor gives a certificate in a case that should be, but has not been, reported to the coroner, the registrar of deaths, when he receives the certificate from the relatives, is unable to register the death, but has a duty to report it to the coroner. In such a case he cannot register the death until he obtains from the coroner the latter's decision and conclusion. Failure on the part of the medical man to report direct to the coroner will, therefore, involve a delay which may aggravate and distress the relatives of the deceased.

Recognition of this avoidable cause of delay led to the initiation some 12 years ago in my district in London of a system whereby hospitals (a few at first) were asked if they would report to me certain classes of cases direct, instead of sending the relatives with an indifferent certificate to the registrar, who might feel unable to accept it. This system has worked well and has gradually been extended, but it

is essentially voluntary and it has never been suggested that there is any legal compulsion behind it.

The effect of reporting to the coroner deaths occurring within 24 hours of the administration of an anaesthetic places upon his (the coroner's) shoulders the responsibility of decision. In the opinion of the learned counsel, the coroner rightly "requires" the information. This is higher than I assessed it and I am grateful to find that I am so well supported and, indeed, carried forward. The reporting of deaths which occur within 24 hours of admission to hospital is a valuable safeguard against unexpected elements and contingencies. It need hardly be pointed out that it is in no sense a reflection upon a hospital that a patient should die soon after admission, but it may well be that a patient should have been sent in much earlier, or that prior treatment has been inadequate, or that there may have been neglect of the patient by himself or others before his admission to hospital. From the coroner's point of view all these are matters of much importance. Incidentally, I have known many cases of criminal abortion, suicide, etc., which have unexpectedly been brought to light in this way.

While, therefore, I think we must all be grateful for the publication of counsel's opinion, it would be wrong to encourage any thought that it indicates a serious divergence of outlook between the coroner and the medical profession. Both of them have their parts to play in a public service that has a great public value, and voluntary co-operation within the legal framework between doctor and coroner is as much to be welcomed in this as in any other sphere of public activity.—I am, etc.,

W. B. PURCHASE,
London, N.W.1. Coroner, Northern District, County of London.

Tetanus

SIR,—In his recent letter (Nov. 21, p. 619) Dr. J. H. Hannan suggests that it is unnecessary to give antitoxin in tetanus because if the spasms can be controlled the body will produce its own antitoxin in due course. I should like to comment on this view, because, although it is true of some mild cases, it would be unwise to assume that it applies to more than a minority.

When a case of tetanus is first seen some toxin is acting on the nervous system (I will call this "fraction A") and there is no evidence that this can be neutralized by antitoxin, more is circulating in the blood and lymph (fraction B) and can probably be neutralized by antitoxin, and still more is being formed in the wound (fraction C), where its potential threat can be met if, when it is absorbed, there is plenty of circulating antitoxin to meet it. The danger of continued absorption from the wound is real and depends on its nature, severity, and the degree of infection. Recovery depends first on whether a lethal dose of fraction A is already acting on the nervous system before antitoxin is given. If this is so the prognosis is hopeless and death will occur whatever is done to control the spasms. Happily in a high proportion of cases this is not so, and it is probable that a large dose of antitoxin neutralizes fraction B and stops further absorption of fraction C, so preventing a lethal dose. After this, if spasms can be controlled and death by exhaustion prevented the patient should recover.

When a patient is first seen it is impossible to say how much toxin has already been absorbed and how much is still present and being formed in the wound. Some cases, of which the one quoted by Dr. Hannan is an interesting example, have only absorbed a sublethal dose, and if no more is absorbed from the wound the patients will recover by their own powers of resistance. Because it is not possible to distinguish these with certainty when they are first seen it is desirable to give a large dose of antitoxin as soon as possible to every case of tetanus. I think that to try to pick and choose those which need and do not need antitoxin will increase the mortality.—I am, etc.,

Cambridge. LESLIE COLE.

Prevention of Small-pox

SIR,—Dr. Arthur Howard (Nov. 14, p. 587) says: "The letter on vaccination against small-pox from Dr. Killick Millard (Oct. 31, p. 530) is typical of the prejudiced point of view of present-day anti-vaccinationists. It contains several misstatements which should be corrected." If Dr. Howard really thinks that I am an anti-vaccinationist he is certainly much mistaken. Few living men can have spent longer hours pleading with persons who were opposed to vaccination to get vaccinated—I refer of course to actual small-pox contacts—than I have done. Very many of these I have succeeded in convincing and have personally vaccinated them.

As regards my alleged misstatements, Dr. Howard specially emphasizes my contention that vaccination is a much more serious operation than immunization against diphtheria. He claims that in his experience "it causes considerably less discomfort and incapacity than the usual injections for immunization against diphtheria." I can only reply that Dr. Howard's experience is quite contrary to my own, and I have had much personal experience of both forms of inoculation. I can only imagine that his experience has been either very small or very exceptional. I think that few medical men will agree with him.

Dr. Howard concludes by urging that a campaign should be started for universal vaccination on the same lines as that now being conducted for immunization. Has it ever occurred to him that for nearly a century this country attempted to control small-pox by universal vaccination and signally failed; that India is still attempting to do so and has failed even more signally, so that small-pox in India is still a terrible scourge, causing many thousands of deaths every year; that for the past half-century we in this country have virtually abandoned the attempt to secure universal vaccination, yet small-pox has all but disappeared and has quite ceased to affect our mortality returns? Diphtheria, on the other hand, still causes thousands of deaths every year, and immunization is still on its trial. The case for universal vaccination against small-pox is, therefore, entirely different from that for mass immunization against diphtheria.—I am, etc.,

Leicester. C. KILLICK MILLARD.

Riboflavin Deficiency

SIR,—I was interested to read Dr. H. Scarborough's account (Nov. 21, p. 601) of his investigations of the ocular signs in riboflavin deficiency, and his description of three cases showing the fully developed ariboflavinosis syndrome. It seems probable that cases of this deficiency are now more common than a review of the literature would indicate. May this not be due to the fact that under wartime conditions we are eating far more carbohydrates and far less proteins and fats than before, and that our vitamin intake is also reduced to a minimum? In all three cases described there appears to have been either some deficiency in absorption or a failure of storage or utilization of the vitamin, the first patient having had a gastric ulcer, the second steatorrhoea, and the third pernicious anaemia superadded.

According to Dr. V. P. Sydenstricker (*Amer. J. publ. Hlth.*, **31,** 344) when you get an excessive carbohydrate intake with a deficient absorption of vitamin or a failure of storage or utilization, the stage is set for a deficiency in one or other of the co-enzymes necessary for starch metabolism.

Apparently the ocular symptoms are among the earliest evidence of riboflavin deficiency, and the striking result of replacement therapy is well illustrated in a case which I saw recently. A married woman aged 43 consulted me in September last complaining of double ptosis, photophobia, progressive dimness of vision, and ocular fatigue; her eyes itched and felt "heavy," and she herself felt nervous and irritable and was easily tired. She had none of the classical signs (fissured lips, cheilosis, glossitis, seborrhoea, etc.) of ariboflavinosis, but had recurrent styes and "ulcers of the gums at about the period times." She had a well-marked cutaneous rosacea, and had complained of dyspepsia for some time. Nine months ago she underwent *x*-ray examination and a benign duodenal ulcer was revealed. She had been put on a diet and had very little meat but plenty of bread-and-butter, potatoes, and Benger's food. Mr. Harold Levy was consulted for her eye symptoms; he diagnosed superficial keratitis and suggested riboflavin therapy. She was given 2 mg. riboflavin orally and 1 mg. riboflavin by injection daily. The response was immediate, and after one week her ocular symptoms improved. Within a fortnight she felt perfectly well in every way and herself volunteered the statement that she had more

energy and the greatest sense of well-being that she had had for months. The cutaneous rosacea was only slightly affected.—I am, etc.,

Muswell Hill, N.10. I. S. FOX.

Shock Treatment in Psychiatry

SIR,—I have read your leading article on shock treatment in psychiatry (Oct. 3, p. 397) and followed the correspondence with great interest, and fully agree with those who deplore this form of treatment as a panacea. I feel it is misleading to compare shock treatment with malarial treatment of G.P.I., for in the latter the pathology is reasonably well defined, while in the former it is still an unknown factor.

If we assume that the symptom is the "total" reaction of the individual towards the "total" environment, then an isolated form of treatment such as E.C.T. without any psychotherapeutic intervention is liable to be of only temporary value.

We have all been able to observe how in any form of shock treatment the patient becomes more accessible and able to form a transference relationship with the physician. This point is stressed by Dr. H. Pullar-Strecker (Nov. 21, p. 619) when discussing insulin treatment, and he also emphasizes the value of psychotherapeutic encouragement.

May not one of the factors in convulsive therapy be a psychological one—i.e., the patient has experienced and successfully passed through a "catastrophic experience," which may be interpreted by him as an atonement for the fantasied unforgivable sin which he has committed.—I am, etc.,

Bishop's Stortford. D. N. HARDCASTLE.

SIR,—Dr. F. T. Thorpe says (Sept. 5, p. 281) that the "beneficial effect of shock therapy in the treatment of the emotional mental disorders is now so firmly established," etc. May I refer him to your annotation on "Brain Damage in Shock Treatment" (May 30, p. 674) and also to Dr. William Sargant's letter (*Lancet*, Sept. 5, p. 293) under the heading of "Recoverable Schizophrenia." In the New York State Hospital "a thousand schizophrenics treated with convulsive therapy did even worse than an equivalent control group left untreated, while over a thousand cases treated with insulin did three times as well." There is much more to the point. I understand from Dr. Sargant's letter that he thinks that, if it is suggested that insulin is now superseded by convulsive therapy, it would be disastrous for the patients concerned. If that is his opinion, I heartily agree with him.—I am, etc.,

Salisbury. HORACE HILL.

Convulsions under Trilene Anaesthesia

SIR,—Dr. Ysobel Garland's account of convulsions under trilene anaesthesia (Nov. 21, p. 607) resembles in some ways a recent experience of mine. The patient was a woman of 58 who had had no previous operation or illness of note. She had morphine 1/4 grain and atropine 1/100 grain an hour before operation, which was for removal of a simple cyst from the right breast. Trilene was the only anaesthetic given, and was administered by the open method on a single layer of Turkish towelling on a Schimmelbusch mask. About 2 drachms were required for induction, which took five minutes. When the patient reached stage 3, plane 1, a layer of Gamgee tissue was interposed between the mask and the face and a pharyngeal airway inserted. Ten minutes after beginning the anaesthetic, when 2½ drachms had been given and the patient was still in the same plane of anaesthesia, cyanosis suddenly developed, respiration stopped, and clonic contractions, confined to the right side of the body, started and lasted about ten seconds. The anaesthetic was stopped, the head lowered, artificial respiration started, and O_2 and CO_2 administered. Breathing was resumed in about 1½ minutes; the operation was finished in a further 20 minutes, anaesthesia being maintained with a further 1½ drachms of trilene without further untoward incident. The pulse was steady and full during the time of respiratory arrest, though somewhat rapid. The patient's temperature was normal throughout both before and after operation, and recovery and convalescence were completely uneventful. It is my impression that such incidents with trilene are due to the effect on the respiratory centre of too strong a concentration of the anaesthetic suddenly inhaled.—I am, etc.,

Nelson, Lancs. T. D. CULBERT.

Tonsillectomy

SIR,—One must agree with Mr. T. B. Jobson (Oct. 31, p. 512) that the use of the guillotine requires long practice and that there are still cases which may defeat even the most expert. To reduce this number to the minimum I have found the following procedure, which I have not seen described, very useful in adults and occasionally in children

The smallest guillotine through which the tonsil can be everted is used and placed so as to avoid both pillars. The tonsil is pushed through with thumb or forefinger and the guillotine is closed. If then a dimple appears when traction is applied one recognizes possible danger of tearing or of buttonholing to the anterior pillar. With a fairly sharp instrument one can break or cut through the strong fibrous bands. The instrument is kept close against the lateral surface of the guillotine and the bands cut through until the dimple disappears. One may then shell out the tonsil as one does in a child without danger of doing damage. A useful instrument for the purpose is a septum separator sharpened with a file. My results with this method are definitely better as regards haemorrhage, appearance, and after-pain than by dissection.

Mr. Norman Patterson's plea (Nov. 14, p. 589) for complete removal of the adenoids is a timely one. It is sometimes said that removal of tonsils and adenoids does not stop the constant succession of "colds" which many of these children suffer from. I would suggest that if a surgeon has more than 1 or 2% of children continuing with colds he should conclude that he is leaving some adenoid tissue behind. A small percentage of these cases are due to sinusitis, which, in the absence of adenoids, clears up as a rule with appropriate treatment. The important thing is to put a finger in the nasopharynx and feel that all the adenoid has been removed. If some is left it can be removed by whatever method the surgeon prefers. Very often the small soft portion at the entrance to the posterior nares can be most easily removed with the gloved finger-nail.

Whatever anaesthetic is given it should allow time for the surgeon to *see* that the tonsils are completely removed and to *feel* that the adenoids are also completely removed.—I am, etc.,

Manchester. E. S. BURT HAMILTON.

Sedimentation Rate

SIR,—During the last twelve months, while I was masquerading as a rural practitioner in Norfolk, I took the opportunity of exploring the usefulness of the sedimentin index in general practice. I found, *inter alia*, that although theoretically the joggling of a car travelling along country lanes is not ideal for the peaceful process of sedimentation, in practice it was amazing how little it affected the maximum velocities. Maximum velocities begun in the peace and warmth of my consulting-room continued unaltered when taken for a ride, and others begun during a round of visits continued unaltered when brought home to rest. True, I never compared the behaviour of a sample of blood taken to market with that of its brother who stayed at home. I hadn't the time or petrol for experiment. But even had I found some disparity between them, it wouldn't have worried me; for I place far more reliance on the trend of serial readings in any case than upon any single reading.

Dr. Della Vida, usually so accurate, has slipped up in one of his statements (Nov. 14, p. 591). When 4 parts of blood are diluted with 1 part of citrate, the original undiluted blood would be 25% "stronger" than the diluted sample; for five of any object is 25% and *not* 20% more than four of any object. I myself discovered this only quite recently, but among mathematicians it appears to have been known for some time.

No extravagant claims for the sedimentin index have appeared in print—yet (although some are on their way). Its wholesale condemnation by Drs. Edwards, Penman, and Cutbill (Nov. 14, p. 591) would therefore appear a trifle proleptic. This attitude of mind is not without glorious precedent, however. The White Queen screamed loudly before the brooch flew open and pricked her; and the King of Hearts, unless my memory is at fault, was all in favour of verdict and sentence before hearing the evidence. One gathers from their letter that they have failed to gain satisfaction from the sedimentin index; and I cannot help feeling that they are

wise in sticking to the simplicities of the Westergren technique, which is, after all, better than nothing. Half a moment, though—is it as simple as all that, involving as it apparently does the use of a constant-temperature chamber? That wouldn't suit me, I'm afraid, nor many other practitioners similarly ill equipped.—I am, etc.,

Hartford, Cheshire. GEORGE DAY.

Obituary

J. G. McCUTCHEON. M.B., CH.B.

Scottish members of the Association, as well as many of their English colleagues, will learn with deep regret of the death of Dr. J. G. McCutcheon of Glasgow. He had for some time been in indifferent health, but he was taken seriously ill while returning from Blackpool to Scotland, and died in a hotel at Carlisle on Nov. 22. Dr. McCutcheon, who attended the recent Annual Representative Meeting, was to his great pride and pleasure re-elected after an interval of thirteen years to the Central Council of the B.M.A. He was previously a member of Council for five years, and he had rendered long and conspicuous service on many committees, especially the Insurance Acts Committee, the old Medico-Political and Parliamentary Committee, and the Central War Emergency Committee, of which he was a member for ten years. He was also a prominent member of the Scottish Committee and had been its chairman. In 1933-4 he was chairman of the Glasgow Division, and in 1936-7 president of the Glasgow and West of Scotland Branch, of which for several years he had been honorary secretary. He was also deputy chairman of the Scottish Central Medical War Committee.

Joseph Glaister McCutcheon, a native of Lanark, was born in October, 1880. In the Boer War he served with the Scots Greys, and after his return to medical study graduated M.B., Ch.B. of Glasgow in 1908. For many years he carried on a large practice in the Townhead district of Glasgow, and later in the West End. During the last war he served with the R.A.M.C. in France and reached the rank of lieut.-colonel. For a number of years he was a member of the Glasgow Corporation; he was also a justice of the peace, and in 1937 was appointed deputy lieutenant for the City of Glasgow. He was chairman of his Panel Committee, chairman of the Medical and Dental Defence Union of Scotland, and a member of the Scottish Blood Transfusion Council. Recently he had been made a medical referee under the Ministry of Pensions.

McCutcheon will be remembered in Association meetings for his interventions in debate, always marked by vigour and good sense, and often by pawky humour. His last speech in London was in praise of health centres and group practice, and he said how much he and his family would look forward, when that came about, to living in a small private house and saving the carpets and the furniture! A genuine spirit of kindliness shone in him, and a love of fun twinkled in his rugged features. He will be greatly missed.

J. L. writes:

The sudden and tragic death of Joe McCutcheon has come as a great shock to his intimate friends, and he had many such. Though poor health, following on serious illness a few years ago, had compelled him to retire from general practice, he had yet been able to undertake work under the Ministry of Pensions, and there was nothing to indicate that his end might be so near. If such were known to him, it was characteristic of the man not to share the knowledge with others. I have enjoyed his intimate friendship for many years. The acquaintance began with a casual meeting on an embarkation wharf in August, 1914, when Capt. McCutcheon, R.A.M.C., Special Reserve, as he was then, was attached to a field ambulance of the B.E.F. By the curious chances of war, we were fated subsequently to be often thrown together, first when I was attached later to the same field ambulance. After nearly a year in that unit Joe was transferred to the Home Establishment and was appointed to the medical charge of the Household Battalion, which he accompanied over-seas. Once again fate brought us together and, from personal acquaintance with the officers of that regiment, I learned of the very high regard in which Joe was held and of the great confidence reposed in him by all ranks; the expression "white man," used of him by one of the officers, perhaps aptly describes their regard. After some months he was transferred once more, and later was appointed D.A.D.M.S. of the Division, with the rank of major. In this position his ability, tact, and cheerfulness made him *persona grata* with all. His final appointment as lieut.-colonel commanding a field ambulance in the same Division maintained our close association up to, and after, the cessation of hostilities.

In his home life Joe was the devoted husband and ideal father. But to the burden of his own poor health there was lately added distress and concern occasioned by his wife's severe and painful illness, so bravely borne by her. In this, perhaps more than in anything else, was displayed the most lovable aspect of his character, while his indomitable cheerfulness was both an encouragement to her and a support to himself. Joe was a man of high ideals and a strong sense of duty. Combined with these were a remarkable power of understanding others, an infinite capacity for taking pains, and an unlimited kindliness of heart. Consideration of self would have been his last thought, and nothing was too great a trouble if he could be of help to others.

EDGAR HAYDON, M.B.

Dr. Edgar Haydon, who died at Newton Abbot, Devonshire, on Nov. 16, was in his 84th year. For 55 of them he was a member of the B.M.A., and in 1922-3 president of the South-Western Branch. He graduated M.B., C.M. with honours at Glasgow in 1881, and held house appointments at the Glasgow Western Infirmary.

Quite apart from his professional practice (writes a colleague) few men have won the affection of a community to a greater extent than Dr. Haydon. He radiated friendliness and encouragement towards everybody and gave himself and his substance to all good works, notably the growth and development of Newton Abbot Hospital; indeed, its whole history from the smallest beginnings in private rooms to its present commodious and up-to-date buildings is epitomized in Dr. Haydon's life. He sponsored appeals from public and private sources that produced thousands of pounds that the public might have the best possible treatment on their doorsteps. Before the last war he secured over £4,000 (a large sum for those days), which purchased radium for the treatment of malignant disease. The war over, the need for further building extension arose and Dr. Haydon went boldly out for £16,000, which was forthcoming in less than two years. He found time, too, for much public work, and served on the Newton Abbot Urban Council for some years. He was a prominent Freemason, and among his honours he was P.M. Devon Lodge 1138 in 1905 and held the rank of P.P.J.G.W. He was thrice president of the local Rotary Club, and for years of the Y.M.C.A. In a country area it was natural, too, that his interest should be linked to agriculture, and in 1923 he became chairman of Devon Agricultural Show Committee. It is difficult to find in the district any aspect of community life that he did not touch in generous and practical ways.

Another colleague writes: The name of Haydon is familiar all over this countryside and beyond, and Edgar Haydon was its most conspicuous representative. For his kindly sympathy and medical skill he was trusted and honoured by all sorts and conditions of men, rich and poor alike. In a way he was a typical family doctor. He came to the town as a young university graduate and succeeded his brother, who died soon after. He took up with enthusiasm the medical and public life of the town and neighbourhood. From its small beginnings the Newton Abbot Hospital was really his chief life-work; and he had a marvellous gift for enlisting the help of rich and poor in its progress. The response of all classes to its needs has been due more to him than to anyone else. He was undaunted by difficulties that would have discouraged many men, and was full of resource, determination, and courage. The last months of his life were clouded by the fact that his only surviving son, Brigadier C. Haydon, was reported to be a prisoner of war. His loss will be felt by his colleagues and friends for many years to come.

Mr. W. SAMPSON HANDLEY writes:

In the country towns of England are often to be found practitioners who, by force of character and by long and efficient service to their patients, have become little kings in their own district, known and trusted by everyone. Such a one was Edgar Haydon. The son of a Devon doctor, he had the inestimable advantage of a country upbringing. As a boy he roamed over Dartmoor and acquired that love of the moor and of horses, and that keen appreciation of Devon character and humour, which in later years gave him the key to so many hearts. His own forebears came from Cornwall, and it was perhaps from some adventurous sailor with his eyes fixed on the horizon that he inherited his wide outlook over the fields of medicine, and the spirit of exploration that to his latest days made him receptive of new methods of treatment.

About 1882 he settled in Newton Abbot, and to that town and district he gave sixty years of strenuous service, only terminated a fortnight before his death. In his earlier years he had medical

charge of the local infirmary, and he used to attribute his success in practice to the recommendations of his Poor Law patients. It was perhaps due equally to the persistence with which, through the years, he pursued his postgraduate education by constant visits to London hospitals, and especially to the Middlesex Hospital, but most of all to his kindly and breezy personality and to his clinical acumen. He became surgeon to the Newton Abbot Cottage Hospital, and it is largely owing to his initiative that it has become an important general hospital. He equipped a new *x*-ray department at his own expense. Impressed with the value of radium for the treatment of cancer he, more than twenty years ago, collected a fund for its purchase, which gave to Newton Abbot the largest stock of radium, for its size, of any town in England. Thus equipped, the Newton Abbot Hospital, mainly through Haydon, has done valuable pioneer work in the use of radium by implantation, attracting cases from a wide district. When the present war began he had just retired from active practice, but upon the calling up of one of his partners he returned to work and seemed for a time to become a younger man, though he was then over 80. More recently acute anxiety about the fate of his only surviving son, a distinguished soldier, after the fall of Tobruk, aged him rapidly. Three of his sons died during the last war, two of them on active service.

Haydon's work did not receive the public recognition it well deserved, nor did he seek it. His house possessed one of the most beautiful gardens, for its size, in England, and is surrounded by a high granite wall within which many rare shrubs flourish. The view extends to his beloved Hey Tor. In this happy setting he passed his useful life, and he has well earned his rest. He was twice married, and leaves a widow to mourn him.

Dr. ARTHUR BIRT died at Halifax, Nova Scotia, on Nov. 19. He was born on Dec. 31, 1864, and was educated at Edinburgh Collegiate School, where he won the gold medal and was Dux of the school. He graduated M.B., C.M. at the University of Edinburgh in 1887 with distinction, and was house-physician at the Edinburgh Royal Infirmary. After serving five years as deputy superintendent at the Durham County Asylum he settled in Nova Scotia, where he became well known as a consulting physician, and published numerous articles in the Canadian medical journals. He proceeded M.D.Ed. with honours in 1898, and was elected a Fellow of the Royal College of Physicians of Canada in 1931.

The Services

The King has approved the award of the R.N.V.R. Officers' Decoration to Surg. Cmdrs. E. A. Gerrard and J. L. Cox and Acting Surg. Cmdr. E. I. Puddy, R.N.V.R.

CASUALTIES IN THE MEDICAL SERVICES

Temp. Surg. Lieut. DOUGLAS JAMES NAUGHTON, R.N.V.R., is included as "missing, believed killed" in an Admiralty Casualty List published on Nov. 19. He was born on May 15, 1913, and was educated at Trinity College, Dublin, where he graduated M.B., B.Ch., B.A.O. in 1941. He held a house post at Hull Royal Infirmary before entering the R.N.V.R. this year.

Surg. Lieut. ALASTAIR BAIRD KENNEDY, R.N.V.R., is reported "missing, presumed killed" on active service. He was born on Aug. 3, 1906, the only son of Mr. and Mrs. A. A. Kennedy of Seaton, Devon, and qualified L.M.S.S.A. in 1940. After holding a resident post at Wellhouse Hospital, Barnet, he entered the R.N.V.R. last January. He leaves a widow.

Lieut.-Col. DELVINE BELL, M.C., R.A.M.C., died at Netley on Nov. 3. He was born on Oct. 22, 1888, and was educated at the University of Edinburgh, where he graduated M.B., Ch.B. in 1911. After serving as resident surgical officer at the Schiff Home and as house-surgeon at the Swansea General and Eye Hospital he entered the R.A.M.C. as lieut. in Oct., 1914. He became lieut.-col. in 1938. He served in the war of 1914-18, was twice mentioned in dispatches, and was awarded the M.C. He had recently been stationed at Cairo.

War Subs. Capt. JOHN WALLS GIBSON, R.A.M.C., was killed in action in the Middle East in November. He was born on April 21, 1917, the only son of Mr. and Mrs. Andrew Gibson of Uphall, Broxburn, West Lothian, and was educated at the University of Edinburgh, where he graduated M.B., Ch.B. in 1939. After working as an assistant to a Leeds firm of doctors he entered the R.A.M.C. as temp. lieut. He was a member of the B.M.A.

Prisoners of War.—War Subs. Capt. J. K. Drucquer, R.A.M.C.; War Subs. Capt. J. H. McLaughlin, R.A.M.C., War Subs. Capt. F. J. Murray, R.A.M.C., War Subs. Capt. R. J. S. Walker, R.A.M.C.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

At a Congregation held on Nov. 20 the degrees of M.B., B.Chir. were conferred by proxy on J. C. N. Westwood and W. K. S. Moore.

UNIVERSITY OF EDINBURGH

At the last meeting of the University Court it was agreed, on the recommendation of the Faculty of Medicine and the Senatus, to invite Prof. E. D. Adrian, O.M., M.D., F.R.S., to deliver the Sharpey-Schafer memorial lecture for 1943.

UNIVERSITY OF GLASGOW

The University Court has accepted an offer from Mr. Fred H. Young, a Glasgow carpet manufacturer, of a sum of £22,000 to endow a lectureship in orthopaedics within the department of the Regius Professor of Surgery. At the request of the donor and with a view to providing clinical facilities, the Court has invited the co-operation of the managers of the Western Infirmary and, at least during the war, of the Department of Health for Scotland. The lectureship will be associated with the post of orthopaedic surgeon (with charge of the out-patient casualty department) at the Western Infirmary and with the post of visiting orthopaedic surgeon to a country emergency hospital in the West of Scotland.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

Annual Meeting of Fellows and Members

The annual meeting of Fellows and Members of the Royal College of Surgeons was held at Lincoln's Inn Fields on Nov. 19. The President, Sir Alfred Webb-Johnson, presented the general report of the Council for 1942. In doing so he referred to a marked quickening of interest on the part of the Fellows and Members in the doings of the College. Many of the concerns now occupying the Council might very largely affect the future of the younger Fellows and Members. In participating in the work of the Medical Planning Commission particularly the Council was desirous of gathering the feeling of the younger surgeons.

The President went on to say that it had been decided that the time had come when changes were needed in the College examinations. The Council had applied for permission to alter the by-laws so as to make the Primary Fellowship examination postgraduate and to add pathology as one of the subjects. A hardship had been experienced in respect to the Final Fellowship examination, whereby many candidates from over-seas could not be admitted to the examination until four years after qualification, or, to avoid this period of waiting, they must take the examinations for the L.R.C.P., M.R.C.S. diplomas, though they were already in possession of university degrees. It had therefore been decided to seek an alteration whereby there would be required from such candidates for the Final examination evidence of training and experience which the Council might from time to time deem necessary in order to maintain the high standard of the Fellowship. Another innovation was the establishment of a research chair in ophthalmology. Finally, he referred to the working together of the three Royal Colleges. There was already a standing joint committee, and the question of post-war building had been considered. Each of the Colleges had shown a desire that all three should be housed on one site, but although sites, including Lincoln's Inn Fields, had been considered, no conclusion had yet been reached. It must be better for all three to work together than to be in different parts of London. One of the Colleges had asked for the drawing up of criteria concerning the training and status of consultants, and this had been done.

In some brief discussion following the President's remarks, Mr. R. M. Handfield-Jones referred to a certain apathy which had existed among Fellows concerning College affairs. In the sister College there was a Comitia which was open to Fellows and at which the Council was able to gather their opinions on matters of internal and external policy. It would be a good thing to elicit the opinion of the general body of Fellows on matters of importance, and meetings for this purpose, while having no status and being quite informal, might strengthen the hands of the Council. Mr. E. A. Crook thanked the President and Council for the anxiety they had shown to learn the feelings of the younger surgeons. Mr. D. H. Patey spoke of the reconstruction of the museum, and suggested that the emphasis in the re-formed collection should be on quality rather than on quantity. The amount of material in the past had been a weakness rather than a strength.

The President, in replying, said that strong reasons would certainly have to be forthcoming if the College consented to move from Lincoln's Inn Fields. It had still about £200,000 worth of building standing, which was not adaptable to any other purpose.

The usual resolution calling for representation of Members on the Council was not taken at this meeting, because since the war there has been no possibility of obtaining any change in the Charter of the College.

Medical Notes in Parliament

Acting Rank in the Army

Sir J. GRIGG, replying to questions on the subject of acting and temporary rank in the Army, said he had reviewed the rules under which officers had been required to relinquish temporary rank on ceasing to perform the duties for which the rank was granted. He had come to the conclusion that there were good grounds for giving the holder of temporary rank, which might have been held for long periods, a greater degree of security in his rank. In future an officer holding temporary rank would be permitted to retain it while on a course of instruction. He would retain it during the interval between being posted away from one unit and joining his new unit, provided he was fit and available for duty during the whole period and any delay in his joining his new unit was due solely to the exigencies of the Service; this would cover the voyage period in the case of officers ordered over-seas. In addition officers would be permitted to retain temporary rank while absent sick up to a period of two months (provided that the sickness was not their fault), and, as previously, for three months if wounded in action.

Venereal Disease

On Nov. 17 Mr. BOOTHBY asked the Secretary of State for Scotland what steps were being taken to combat the menace of venereal disease by means of propaganda designed to encourage preventive measures and to secure immediate treatment in cases of infection. Mr. JOHNSTON said he hoped to issue to local health authorities this week a circular reminding them of the continuing need for enlightenment of the public about venereal disease and urging them to consider at once an expansion of their arrangements in this respect.

Dr. SUMMERSKILL asked if the Minister was aware that the Government had introduced a regulation on this subject which, from a medical point of view, was so limited in character that it would be quite ineffective in stamping out venereal disease. Mr. JOHNSTON: That regulation has been drafted on the advice of our skilled medical officers.

On Nov. 17 Major LLOYD asked the Secretary of State for Scotland whether, to combat the increase in venereal disease in certain areas in Scotland, he would take immediate steps to make this disease compulsorily notifiable, empowering local authorities to follow up and treat the victims of the disease. Mr. JOHNSTON said that the first part of the question raised highly controversial issues, but powers had been taken by Defence Regulation under which medical officers of health might require any person who had been reported by two separate patients as the source of infection to undergo medical examination and any necessary treatment, and to remain under treatment until certified free from infection. He was bringing these powers to the attention of local health authorities and their medical officers of health. The result of the operation of the Regulation would be kept under regular review.

Industrial Medicine

Sir DAVID MUNRO, addressing the Conservative Health and Housing Committee on Nov. 17, referred to what he termed the charter of the works medical service given by Mr. Bevin in his Order of July, 1940, in which it was laid down that factory managements were to engage doctors and/or nurses in circumstances recommended by the Factory Department. Not all firms could engage a whole-time doctor, but the larger number of part-time doctors thus drawn in would promote the education—badly needed—of general practitioners in occupational disease. With illustrations from the Royal Ordnance Factory Medical Service, Sir David indicated what a State service might do in the selection of operatives for their suitable occupations, in improving their health and efficiency at work, and in rehabilitating them after injury or illness. He envisaged an institute of industrial medicine, at which, for instance, all toxic substances should be examined for their harmful effects before being taken into industrial use, and a diploma of industrial medicine, perhaps even a membership and fellowship under the aegis of such a body as the Royal College of Physicians. The medical services were part of welfare, and there should be in every factory a fusion between production, management, and health and welfare services. All were a function of management. This was achieved at the Ministry of Supply by a Welfare Board.

Pensions Appeal Tribunals

The Debate on the Address was resumed in the House of Commons on Nov. 18 and succeeding days.

Major MILNER said the delay in setting up pensions appeal tribunals was inexcusable. He understood that if the Medical Personnel Priority Committee were directed by the Government it could find the doctors for the staffing of these tribunals—a matter of 50. Sir STAFFORD CRIPPS replied that the desirability of these tribunals was not an issue. The sole question was whether at present it was possible to constitute them. All the suggestions for temporary or alternative procedure had not been approved by the organizations representing ex-Service men. The Ministry of Pensions found great difficulty in getting sufficient medical men for its current needs. Those coming forward were not suitable, or those suitable were not sufficient. Not the Central Medical War Committee, nor the Services Departments, nor the Priority Committee could provide a sufficient number of highly qualified medical men to carry on the purposes of these tribunals. These bodies had been asked, and that was their answer.

Dr. HADEN GUEST interposed to say the chairman of the Priority Committee had told him he might say this was not so. Sir STAFFORD said that, granted priority, medical men could be taken away from the Services, but to get medical personnel of sufficiently high standard for final tribunals was, at the present time, impossible.

War Workers and Hours of Work

Mr. BROWN told Sir Robert Young on Nov. 19 that he had seen a Press report of the proceedings of the Annual Panel Conference, and particularly the statements made by medical men regarding the health conditions of war workers, and allegations of physical and mental exhaustion as the result of excessive hours of work. The conference had not made any reference to him on the matter. Should it do so, he would certainly consider what action on his part appeared to be called for.

Nutritional Anaemia

Replying to Dr. Summerskill on Nov. 19, Mr. BROWN said his attention had been called to an article in the medical press which stated that evidence of nutritional anaemia had been found among certain groups of women and young children. He had therefore arranged for iron preparations to be available in all day and residential nurseries and in emergency maternity homes. The majority of welfare authorities already provided similar preparations at their centres for expectant mothers and young children found to require them.

Panel Capitation Fee

Sir LEONARD LYLE asked on Nov. 19 if Mr. Brown knew that since the start of the war the general body of insurance practitioners had tried to secure an increase in the capitation fees adequate to enable them to meet the extra cost of wartime conditions and the increased work involved, the increase suggested being 2s., of which only 9d. was approved; and whether he had reached a decision on the representations made to him on this subject by the Insurance Acts Committee of the B.M.A. Mr. BROWN said he had received representations from the committee to this effect. He had agreed that from the beginning of this year the capitation fee should be increased from 9s. to 9s. 9d. a year to meet the increase in practice expenses and the loss of private fees from the new class of insured persons. He had considered the request made this year for a further increase, and on Oct. 17 he informed the committee that he was not able to accede to it.

Medical Advisory Committee

Sir FRANCIS FREMANTLE on Nov. 26 asked what steps the Minister of Health was taking to keep in touch with representative medical opinion in regard to the planning of the future of health services. Miss HORSBRUGH said Mr. Brown had for some time felt the need for associating with the work of the Ministry of Health a representative body of medical men and women engaged mainly in the clinical practice of their profession. He had therefore set up a Medical Advisory Committee whose terms of reference were to advise him on the medical aspects of problems relating to the health of the people. [The names of the members of the committee are published on page 670.]

Nurses' Eligibility for Workmen's Compensation.—On Nov. 10 Mr. WILLIAM BROWN asked the Home Secretary whether he would take steps to ensure that the nursing profession came within the scope of the Workmen's Compensation Acts. Mr. PEAKE replied that Mr. Brown was under a misapprehension in thinking that the nursing profession as such was outside the scope of the Act. In any individual case it depended on whether the nurse worked under a contract of service, and from a decision of the Court of Appeal in 1938 it appeared that, generally speaking, nurses in hospitals and similar institutions came within the Act.

Committee on Medical Schools.—On Nov. 24 Mr. MANDER asked the Minister of Health the position with regard to the Committee on Medical Schools which was considering the desirability of increasing the facilities for women to study in medical schools in London, and when a report was expected. Miss HORSBRUGH replied that she could not give a date for the report, but the issues involved were of first-rate importance and would demand some time for examination.

No. 45

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended Nov. 14.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1942					1941 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	50	5	25	—	5	113	6	24	2	9
Deaths		1	—				2	4		
Diphtheria	940	42	213	65	10	1,069	43	275	28	32
Deaths	17	1	6	4	—	24	6	7	4	3
Dysentery	148	21	50	—	2	148	12	58	—	—
Deaths		—	—	—	—		2	—	—	—
Encephalitis lethargica, acute	2	—	1	1	—	3	—	1	—	—
Deaths		—	—				—	—		
Erysipelas		—	68	11	—		—	80	14	5
Deaths			—					—		
Infective enteritis or diarrhoea under 2 years				71						
Deaths	66	10	18	18	8	41	2	16	16	8
Measles	7,731	244	409	6	42	747	52	29	32	2
Deaths	7	—	—	—	—	1	—	—	2	—
Ophthalmia neonatorum	83	2	14	1	—	84	2	8	—	—
Deaths										
Paratyphoid fever	3	2	2	—		31	4	2	—	
Deaths	—	—	—	—	—	1	—	—	—	
Pneumonia, influenzal*	556	28	15	2	8	731	27	15	1	5
Deaths (from influenza)	22	1	2	—	—	20	—	5	1	5
Pneumonia, primary			165	14				214	5	
Deaths		—		10	11		25		9	—
Polio-encephalitis, acute	—	—				4	—			
Deaths		—					—			
Poliomyelitis, acute	16	1	1	22	—	33	2	2	4	1
Deaths		—	—	—			—	—	—	
Puerperal fever	—	2	16	4	—	1	1	16	2	1
Deaths		—					—			
Puerperal pyrexia	153	9	12		2	107	6	13		—
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	2,880	176	392	58	54	1,366	36	229	51	30
Deaths	—	—	—	—	—	1	—	—	1	—
Small-pox	—	—	10		—	—	—	—		—
Deaths		—	—	—	—		—	—	—	—
Typhoid fever†	13	—	1	7	2	12	1	2	14	3
Deaths	1	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths				—	—			—	—	—
Whooping-cough	1,155	75	28	86	6	2,029	206	69	31	8
Deaths	4	—	2	—	—	2	—	—	—	—
Deaths (0–1 year) Infant mortality rate (per 1,000 live births)	355	35	62	43	22	332	32	51	41	26
Deaths (excluding still-births)	4,133	628	618	192	142	4,296	602	564	211	140
Annual death rate (per 1,000 persons living)			13·9	12·8	‡			12·3	14·0	‡
Live births	5,794	674	841	415	254	4,840	462	719	271	213
Annual rate per 1,000 persons living			17·4	27·7	‡			14·6	18·0	‡
Stillbirths	208	24	40			164	13	33		
Rate per 1,000 total births (including stillborn)			45					44		

* Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

† Includes paratyphoid A and B for Northern Ireland.

‡ Owing to evacuation schemes and other movements of population, birth and death rates for Northern Ireland are no longer available.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* during the week a sharp rise occurred in the incidence of measles 347, whooping-cough 190, scarlet fever 144, and diphtheria 59. Cerebrospinal fever, with a drop of 15 in notifications, is now at the lowest level since 1939.

Yorks West Riding had the largest rise in the notifications of scarlet fever 71, and of diphtheria 31; while Lancashire, with 23 more cases than last week, had the greatest increase in whooping-cough.

The notifications of dysentery were 6 more than last week. Outbreaks were reported during the week from Yorks West Riding (Leeds C.B. 18) and in Hertfordshire, where 11 cases were recorded in the adjacent rural districts of Berkhamsted and Watford; 21 more cases were recorded in the outbreak in Yorks North Riding, Middlesbrough C.B. In London the cases rose from 14 to 21, and in Wales from 8 to 14. Other important centres of infection were Durham 12, and Surrey 10.

In *Scotland* a rise again occurred in the incidence of measles, 30 cases, while a fall was registered for diphtheria, 46, and for scarlet fever, 61. Notifications of measles were high in the burghs of Dundee and Kirkcaldy—in the former rising from 47 to 104, and in the latter from 29 to 56.

In *Eire* there were a few more cases of poliomyelitis; during the past ten weeks 226 cases have been notified. The outbreak of typhus in Galway, 13 cases, has resulted in 1 death. The increasing incidence of scabies is causing concern to the local authorities.

Small-pox

No fresh cases have been confirmed in Edinburgh during the last week. At present there are 20 patients and 1 under observation in the small-pox wards. No further cases have been reported from Cowdenbeath. A suspected case in Perth was not confirmed, but small-pox has appeared in a new area—the case of a young male in Inverurie, Aberdeenshire, having been reported.

Measles

The notifications of measles in England and Wales are higher than they have been for over a year. The largest increases recorded during the week under review were those of Yorks West Riding 282, and Lancashire 75. These two counties had almost half—3,840 out of 7,731—of the total cases in the country, and their recent experience has influenced to a considerable extent the general trend of this disease. Since the beginning of September the weekly notifications have been more than doubled in Lancashire, and a six-fold increase has occurred in Yorks West Riding. Particularly severe outbreaks have been recorded in some of the county boroughs of these counties. The largest totals during the week reviewed were: Yorks West Riding, Bradford C.B. 505, Leeds C.B. 386, Huddersfield C.B. 167, Sheffield C.B. 120; Lancashire, Manchester C.B. 282, St. Helens C.B. 206, Blackpool C.B. 146.

Returns for the Week Ending November 21

The returns of infectious diseases in England and Wales included the following: scarlet fever 2,914, whooping-cough 1,246, diphtheria 1,001, measles 8,816, acute pneumonia 645, cerebrospinal fever 68, dysentery 117, paratyphoid 5, typhoid 6.

Medical News

Dr. Donald Hunter, F.R.C.P., will deliver the Finlayson Memorial Lecture on "Generalized Diseases of the Skeleton" in the hall of the Royal Faculty of Physicians and Surgeons, 242, St. Vincent Street, Glasgow, on Wednesday, Dec. 9, at 4 p.m.

At a meeting of the Section of Therapeutics of the Royal Society of Medicine on Dec. 8, at 2.30 p.m., a discussion on "The Aetiology of Erythroblastosis Foetalis on Certain Haemolytic Transfusion Reactions, with Special Reference to the Rh Factor" will be opened by Drs. P. L. Mollison and G. L. Taylor.

The last lecture in this year's autumn programme of Chadwick Public Lectures will be given on Tuesday, Dec. 8, at 2.30 p.m., at the Royal Society of Tropical Medicine, 26, Portland Place, W., by Dr. W. Norwood East on "The Differentiation, Prevention, and Treatment of Anti-social Behaviour Disorders." Admission is free; tickets are not required.

A meeting of the Pharmaceutical Society will be held at Friends House, Euston Road, N.W., on Thursday, Dec. 10, at 2.30 p.m., when Dr. R. Melville will deliver a lecture on "Medicinal Indigenous Plants."

On Nov. 25 Mr. Arthur W. Down celebrated his 90th birthday. Throughout its existence he has been the guiding spirit of Down Bros. Ltd., surgical instrument manufacturers.

An appointments bureau for out-patients, open from 9 a.m. to 5 p.m., came into operation at the Charing Cross Hospital on Dec. 1. Doctors are invited to telephone or write for appointments. Members of the public also may write for an appointment or apply personally at the hospital. The creation of this bureau is in line with the general policy of the big London general hospitals, which are using the appointments system in an effort to save the time of patients and to enable the hospital authorities to organize a schedule of working.

The Council of the National Association for the Prevention of Tuberculosis passed the following resolution on Oct. 19: "The Government declaration on tuberculosis is a great step forward which all interested in the eradication of this disease will most heartily welcome. The National Association desires also to congratulate the Minister of Health and the Secretary of State for Scotland on having brought forward this great reform and offers its whole-hearted co-operation in the practical working of the scheme. The National Association is taking the earliest possible opportunity of obtaining further information about the scheme."

Dr. B. A. Thomas (Gray's Inn) was called to the Bar on Nov. 17.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1.

ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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QUERIES AND ANSWERS

Sulphonamides for Leukaemia?

Dr. J. HARTON RAYNER writes to ask if drugs of the sulphonamide group have been used with any effect in the leukaemias by reason of their known leucopenic action.

Intractable Urticaria

C. B. suggests that J. R. (Nov. 28, p. 654) should minutely investigate the possibility of the condition being due to dental sepsis or infection of nasal sinuses. The association is not unusual.

First-aid Treatment of Wounds

Dr. CYRIL GOULD (Corps Surgeon, Luton Corps, St. John Ambulance Brigade) writes: In reply to J. R. L. (Oct. 31, p. 534), first aid is not treatment, but *assistance* rendered at the time of the emergency with such material as may be available until medical aid is procurable. Candidates for the B.R.C. or St. John Ambulance Association exams are, or should be, examined on the manuals, and therefore lecturers should keep strictly to the books. Having passed their first-aid exam, personnel of first-aid posts, etc., may be taught the particular treatment of wounds, burns, etc., the M.O. i/c prefers.

Income Tax

Consultant. Entertainment Expenses

XX has been assessed as a consultant for some years and has been allowed to deduct an estimated amount (15s. per week) for expenditure incurred in entertaining general practitioners at his house in order to maintain the personal contacts which he regards as necessary for his practice. A new inspector of taxes now says that he knows of no authority for the deduction and proposes to discontinue it.

*** The question of entertainment expenses is a difficult one. To be allowable expenses must come within the description "money wholly and exclusively laid out or expended for the purposes of the . . . profession." In applying this rule some bodies of Commissioners take a more stringent line than others. Broadly speaking, such allowances are made, on reasonable evidence being produced, in the case of ordinary business people, or commercial travellers, but some of the more important bodies of Commissioners refuse to make such deductions in the case of professions—e.g. barristers, or even stockbrokers. The ground of refusal is usually that the expense is too indirect to justify its being charged against professional profits. If XX feels satisfied as to his facts and is prepared to support his claim by oral testimony, we suggest that he should appeal, preferably to the Special Commissioners rather than to the local Commissioners.

LETTERS, NOTES, ETC.

Unusual Skin Sensitivity

Dr. ZIKMUND WINTER (London, W.C.1) writes: Dr. Allan Bigham's report (Nov. 14, p. 578) of a recent case of abnormal skin sensitivity is of great interest. It seems to me the only appropriate explanation that could be given is the pressure with stimuli of different temperature and not the negative sensitivity to gold. His observation proves that the mechanical stimulus of pressure in certain sensitive subjects does not produce the typical triple response (Lewis) if its temperature is lower than the skin. One must conclude that in areas where the wedding ring had been pressed against the skin the liberation of "H substance" did not take place; consequently the complex vascular response with vesicle formation failed to appear. This patient apparently belonged to the group of subjects where pressure elicits the triple response only if applied with stimuli of body temperature. It is very difficult to assume a negative sensitivity of skin to gold, but easier the negative sensitivity to pressure with cold objects.

Control of Venereal Disease: Correction

In our leading article on Nov. 21 (p. 611) it was said that "the arguments adduced by the British commission against compulsory measures were that they (1) may induce the infected to conceal the disease from fear of exposure, (2) are not easy to apply in such a densely populated country as this on account of the difficulty in tracing those who try to evade the law, (3) may open the way to blackmail, and (4) are not consonant with the British idea of the liberty of the subject." The arguments thus quoted were not in fact put forward by the British commission of experts sent to Holland and Scandinavia in 1937 by the Minister of Health, but appeared in some preliminary remarks in our issue of June 11, 1938, before summarizing the report of that commission.

MEDICINE 100 YEARS AGO

Extract from a leading article in the *Provincial Medical Journal* of Dec. 3, 1842:

"The condition of the dwelling-houses of the poorer classes, whether as regards their internal economy or external situation, forms a most important object of inquiry to the philanthropist and the physician. When we reflect upon the influence which the varying circumstances of site and elevation, and exposure to air and moisture, must exercise upon the health and comfort of the artisan and the cottager—when it is considered that the free circulation of air, the access of light, and protection from cold and damp, and from noxious exhalations and impurities, whether of the air respired or the water employed in the various branches of domestic economy, are important to all, but doubly so to those who are from poverty deprived of the means of guarding against many of the inlets to disease—there is little need of labored argument to show the importance of such inquiries. No reflecting person, who is conversant with the habits, and, from personal inspection, familiar with the dwellings of the working population of this country, will hesitate to admit that there is great room for improvement in both. The site of the houses of the manufacturing portion of our population, in particular, has been too generally chosen with reference to the one only view of proximity to the factory, regardless alike of the comfort and the health of the inmates. These houses are for the most part situated in the midst of the noxious effluvia generated by the various processes carried on at the manufactory, because it is considered advantageous that the workman should be near at hand; they are crowded into a small space, the value of the ground not allowing of sufficient room for much attention to ventilation, or to the admission of light. The banks of rivers and canals being desirable situations for factories, as well on account of the supply of water for working the machinery, as for the convenience of transporting the products of labor, the ground is very frequently swampy, and drainage, or other means of providing against accumulation of dirt and filth, rarely enters into the contemplation either of owner or occupier of the miserable tenements with which such places abound. Can it then be a matter of surprise that the population reared under such circumstances should be squalid, stinted in growth, scrofulous in constitution, and careless of those decencies of every-day life in the absence of which there is no check to the development of vicious tastes, no impediment to the indulgence of vicious appetites? Can it be a matter of surprise that in such places scrofula, pulmonic affections, and rheumatism are endemic, and that fever and scarlatina, cholera, diarrhoea, and dysentery are frequent in their visitations and assume their most fearful and fatal characters?"